# FUTERA II SERIES FINNED COPPER GAS BOILERS & WATER HEATERS INSTALLATION & OPERATING INSTRUCTION

**DESIGNED AND TESTED ACCORDING TO A.S.M.E. BOILER AND PRESSURE VESSEL CODE, SECTION IV FOR A MAXIMUM ALLOWABLE WORKING PRESSURE OF 160 PSI WATER.**

**WARNING: If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.**

**Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.**

**WHAT TO DO IF YOU SMELL GAS:**

- **Do not try to light any appliance.**
- **Do not touch any electrical switch. Do not use any phone in your building.**
- **Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

**Installation and service must be performed by a qualified installer, service agency or the gas supplier.**

INSTALLER, THESE INSTRUCTIONS TO BE AFFIXED ADJACENT TO THE BOILER / WATER HEATER.
CONSUMER, RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE PURPOSES.

260 North Elm Street
Westfield, MA 01085
Phone: (413) 568-9571
Fax: (413) 568-9613

1300 Midway Boulevard
Mississauga, Ontario L5T 2G8 Canada
Phone: (905) 670-5888
Fax: (905) 670-5782

www.rbiwaterheaters.com

A MESTEK COMPANY

# FUTERA II INSTALLATION AND OPERATION INSTRUCTIONS

AVERTISSMENT. Assurez-vous de bien suivre les instructions données dans cette notice pour réduire au minimum le risque d'incendie ou d'explosion ou pour éviter tout dommoge matériel, toute blessure ou la mort

Ne pas entreposer ni utiliser d'essence ou ni d'autres vapeurs ou liquides inflammables à proximité de cet appareil ou de tout autre appareil.

QUE FAIRE SI VOUS SENTEZ UNE ODEUR DE GAZ:

- Ne pas tenter d'allumer d'appareil.
- Ne touchez à aucun interrupteur; ne pas vous servir des téléphones se trouvant dans le bâtiment.
- Appelez immédiatement votre fournisseur de gas depuis un voisin. Suivez les intructions du fournisseur.
- Si vous ne purvez rejoindre le fournisseur, appelez le service des incendies.

L'installation et l'entretien doivent être assurés par un installateur ou un service d'entretien qualifié ou par le fournisseur de gaz.

## CONTENTS


| | |
|---|---|
| Before Your Start | page 2 |
| Ratings & Capacities | page 3 |
| Location | page 3 |
| Combustion Air & Ventilation | page 3 |
| Venting Guidelines | page 5 |
| Common Vent Systems | page 11 |
| General Piping Requirements | page 11 |
| Heating System Piping | page 12 |
| Domestic Water Supply Piping | page 15 |
| Gas Supply Piping | page 17 |
| Electrical Wiring | page 17 |
| Boiler/Water Heater Operation | page 18 |
| Operating Instructions | page 18 |
| Checking, Adjustment & Operation | page 19 |
| Diagnostics | page 22 |
| Maintenance | page 22 |
| Trouble-Shooting | page 24 |
| Repair Parts | page 25 |


## BEFORE YOU START

This manual covers the application, installation, operation and maintenance of a Futera II Series finned copper heating boiler/water heater.

To obtain the safe, dependable, efficient operation and long life for which this heating boiler/water heater was designed, these instructions must be read, understood and followed.

The Futera II Series finned copper heating boiler/water heaters have been design certified by CSA for use with natural and propane gas under the latest revision of ANSI-Z21.10.3/CSA 4.3, Gas Water Heaters, ANSI-Z21.13/CSA 4.9, Gas-Fired Low Pressure Steam and Hot Water Boilers and CAN1-3.1, Industrial and Commercial Gas Fired Packaged Boilers. Each unit has been constructed and hydrostatically tested for a maximum working pressure of 160 psi in accordance with Section IV of the A.S.M.E. Boiler and Pressure Vessel Code.

All aspects of the boiler/water heater installation must conform to the requirements of the authority having jurisdiction, or, in the absence of such requirements, to the National Fuel Gas Code, ANSI Z223.1-latest revision. Where required by the authority having jurisdiction, the installation must conform to the Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1.

In Canada, the installation must be in accordance with the requirements of CSA B149.1 or .2, Installation Code for Gas Burning Appliances and Equipment.

The owner should maintain a record of all service work performed with the date and a description of the work done. Include the name of the service organization for future reference.

Direct all questions to your RBI Water Heaters distributor or contact the RBI Customer Service Department at: 260 North Elm Street, Westfield, MA 01085 for US or 1300 Midway Boulevard, Mississauga ONT L5T 2G8 for Canada. Always include the model and serial numbers from the rating plate of the boiler/water heater in question.

# FUTERA II INSTALLATION AND OPERATION INSTRUCTIONS

## RATINGS & CAPACITIES

Before undertaking the installation of the Futera II Series boiler/water heater check the rating plate to ensure that the unit has been sized properly for the job. The "Net I=B=R Ratings" specify the equivalent amount of direct cast iron radiation that the unit can supply under normal conditions. Also ensure that the unit has been set up for the type of gas available at the installation site. Other important considerations are the availability of an adequate electrical supply, fresh air for combustion and a suitable chimney or vent system.

## BOILER/WATER HEATER LOCATION

1. This boiler/water heater is suitable for indoor and outdoor installations. Locate the boiler/water heater in an area that provides good access to the unit. Servicing may require the removal of jacket panels. Allow the minimum clearances between adjacent construction and the boiler/water heater as listed in Table 1. Accessibility clearances must take precedence over fire protection clearances.

| Table 1 | Clearance to Combustibles | Service Clearance |
|---|---|---|
| Top | 24" (610 mm) | 36" (914 mm) |
| Back | 14" (356 mm) | 24" (610 mm) |
| Left Side | 6" (153 mm) | 12" (306 mm) |
| Right Side | 6" (153 mm) | 12" (306 mm) |
| Front | 8" (203 mm) | 36" (914 mm) |

2. An optimum site will be level, central to the piping system, close to a chimney or outside wall and have adequate fresh air for combustion. Ensure that the boiler/water heater is level from front to back and from side to side. Use metal shims to level the boiler/water heater. Electrical and electronic components must also be protected from exposure to water during operation and maintenance. DO NOT install this boiler/water heater in a location that would subject any of the gas ignition components to direct contact with water or excessive moisture during operation or servicing.

3. Ensure that the floor is structurally sound and will support the weight of the boiler/water heater.

**NOTE:**
**The Futera II may be installed directly on combustible flooring, but never on carpeting.**

4. Locate the boiler/water heater in an area that will prevent water damage to adjacent construction should a leak occur or during routine maintenance. If such a location doesn't exist, a suitable drain pan that's adequately drained must be installed under the unit.

5. DO NOT place this boiler/water heater in a location that would restrict the introduction of combustion air into the unit or subject it to a negative pressure, see VENTING GUIDELINES.

6. NEVER place this boiler/water heater in a location that would subject it to temperatures at or near freezing. See the **Freeze Protection Section** on page 12.

**CAUTION**
**Units installed outdoors MUST be protected from ice and snow accumulation or the unit will be damaged voiding the warranty!**

WARNING
Never store combustible materials, gasoline or any product containing flammable vapors or liquids in the vicinity of the boiler/water heater. Failure to comply with this warning can result in an explosion or fire causing extensive property damage, severe personal injury or death!

## COMBUSTION AIR & VENTILATION

WARNING
This boiler/water heater must be supplied with combustion air in accordance with Section 5.3, Air for Combustion & Ventilation, of the latest revision of the National Fuel Gas Code, ANSI Z223.1 and all applicable local building codes. Canadian installations must comply with CAN/ CGA B149.1 or .2 Installation Code for Gas Burning Appliances and Equip-ment, or applicable provisions of the local building codes. Failure to provide adequate combustion air for this boiler/water heater can result in excessive levels of carbon monoxide which can result in severe personal injury or death!

To operate properly and safely this boiler/water heater requires a continuous supply of air for combustion. NEVER store objects on or around the boiler/water heater!

**CAUTION**
**Combustion air contaminated with fluorocarbons or other halogenated compounds such as cleaning solvents and refrigerants will result in the formation of acids in the combustion chamber. These acids will cause premature failure of the boiler/water heater voiding the warranty!**

**CAUTION**
**If the boiler/water heater is operated while the building is under construction it MUST be protected from wood, concrete, sheet rock and other types of dust or the unit will be damaged voiding the warranty!**

Buildings will require the installation of a fresh air duct or other means of providing make-up air if the intake air option isn't used. Any building utilizing other gas burning appliances, a fireplace, wood stove or any type of exhaust fan must be checked for adequate combustion air when all of these devices are in operation at one time. Sizing of an outside air duct must be done to meet the requirements of all such devices.

WARNING
Never operate the Futera II in an environment subjected to a negative pressure unless it is Direct Vented. Failure to comply with this warning can result in excessive levels of carbon monoxide causing severe personal injury or death!

**All Air From Inside The Building**
If the Futera II is to be located in a confined space the minimum clearances listed in Table 1 must be maintained between it and any combustible construction. When installed in a confined space **without the intake air option** two permanent openings communicating with an additional room(s) are required. The combined volume of these spaces must have sufficient volume to meet the criteria for an unconfined space. The total air requirements of all gas utilization equipment, fireplaces, wood stoves or any type of exhaust fan must be considered when making this determination. Each opening must have a minimum free area of 1 $in^2$/1000 Btu/hr (2200 $mm^2$/kW) based on the total input rating of ALL gas utilization equipment in the confined area. Each opening must be no less than 100 square inches (64516 $mm^2$) in size. The upper opening must be within 12 inches (300 mm) of, but not less than 3 inches (80 mm) from, the top of the enclosure. The bottom opening must be within 12 inches (300 mm) of, but not less than 3 inches (80 mm) from, the bottom of the enclosure.

**All Air From Outside The Building**
When installed in a confined space **without the intake air option** two permanent openings communicating directly with, or by ducts to, the outdoors or spaces that freely communicate with the outdoors must be present. The upper opening must be within 12 inches (300 mm) of, but not less than 3 inches (80 mm) from, the top of the enclosure. The bottom opening must be within 12 inches (300 mm) of, but not less than 3 inches (80 mm) from, the bottom of the enclosure.

Where directly communicating with the outdoors or communicating with the outdoors through vertical ducts, each opening shall have a minimum free area of 1 $in^2$/4000 Btu/hr (550 $mm^2$/kW) of the total input rating of all of the equipment in the enclosure.

Where communicating with the outdoors through horizontal ducts, each opening shall have a minimum free area of 1 $in^2$/2000 Btu/hr (1100 $mm^2$/kW) of the total input rating of all of the equipment in the enclosure.

When ducts are used, they must have the same cross-sectional area as the free area of the opening to which they connect.

**Table 2 – Make-up Air Duct Sizing**

| | Required Cross Sectional Duct Area $in^2$ ($cm^2$) | | |
|---|---|---|---|
| Input (MBH) | 1/4" (6.4 mm) Wire Screen | Metal Louvers | Wooden Louvers |
| 500 | 125 (806) | 167 (1077) | 500 (3226) |
| 750 | 187 (1206) | 250 (1613) | 750 (4839) |
| 1000 | 250 (1613) | 333 (2148) | 1000 (6452) |
| 1250 | 313 (2019) | 416 (2684) | 1250 (8065) |
| 1500 | 375 (2419) | 500 (3226) | 1500 (9677) |
| 1750 | 437 (2819) | 583 (3761) | 1750 (11,290) |
| 1950 | 486 (3135) | 649 (4187) | 1950 (12,581) |

When calculating the free area necessary to meet the make-up air requirements of the enclosure, consideration must be given to the blockage effects of louvers, grills and screens. Screens must have a minimum mesh size of 1/4" (6.4mm). If the free area through a louver or grill is not known ducts should be sized per Table 2 above.

**Intake Air Option – General Guidelines**
This configuration provides combustion air directly to the boiler/water heater's air intake using a dedicated pipe when using the direct vent option. The RBI air intake adapter must be fitted to the blower inlet. Combustion air can be drawn in horizontally through an outside wall or vertically through the roof, see Figures 1, 2, 3 & 4.

WARNING
Each boiler/water heater must have it's own intake air system. Common intake air systems are not to be used! Improper installation can result in excessive levels of carbon monoxide which can cause severe personal injury or death!

Single wall galvanized smoke pipe, single wall aluminum pipe, flexible aluminum pipe, PVC or CPVC pipe can be used for the intake air pipe. It must be sized per Table 3.

**Table 3 – Intake Air Pipe Sizing**

| Model Size | Pipe Diameter $in^2$ ($mm^2$) |
|---|---|
| 500 | 8 (203) |
| 750, 1000 | 10 (254) |
| 1250, 1500 | 12 (305) |
| 1750, 1950 | 14 (356) |

All joints in metal intake air systems must be secured using corrosion resistant fasteners and sealed using a suitable Silicone caulk. If PVC or CPVC is used, the joints must be cleaned with a suitable solvent and connected using a solvent based PVC cement. **The intake air system MUST be supported by the building structure not the boiler/water heater.**

A stack damper interlocked with the unit should be installed in the intake air pipe when the infiltration of subfreezing air could occur, otherwise the unit could freeze up.

**Intake Air Option – Vertical Guidlines**
The maximum equivalent length for the vertical intake air pipe is 60 feet (19.7 m). Each 90˚ elbow and the intake air cap are equal to 10 linear feet (3.3 m) of pipe.

A listed, nonrestrictive intake air cap must be used. The intake air cap must terminate as shown in Figure 3. The penetration point in the roof must be properly flashed and sealed.

**Intake Air Option – Horizontal Guidlines**
The maximum equivalent length for the horizontal intake air pipe is 60 feet (19.7 m). Each 90˚ elbow and the intake air terminal are equal to 10 linear feet (3.3 m) of pipe. If horizontal runs exceed 5 feet (1.5 m) they must be supported at 3 foot (0.98 m) intervals with overhead hangers. The certified intake air terminal from RBI must be used, see Figures 1, 2 and 4.

## GENERAL VENTING GUIDELINES

WARNING The vent installation must be in accordance with Part 7, Venting of Equipment, of the National Fuel Gas Code, ANSI Z223.1-latest revision or applicable provisions of the local building codes. Canadian installations must comply with CAN/CGA B149.1 or .2 Installation Code. Improper venting can result in excessive levels of carbon monoxide which can result in severe personal injury or death!

All vent systems must be fully supported by the building structure and not by the boiler/water heater. Appropriate thimbles and fire-stops must be used where required.

WARNING Each boiler/water heater must have it's own vent system. Common positive pressure vent systems are not to be used! Improper installation can result in excessive levels of carbon monoxide which can cause severe personal injury or death!

**Note: When a barometric damper is used it must be installed directly to the boiler/water heater flue outlet to ensure proper operation.**

## VENT SYSTEM OPTIONS

The Futera II may be vented the following ways:

1) **Direct Vent (Positive Pressure)**, uses a vent system certified to UL 1738 for installations in the United States, ULS636 for installations in Canada. Combustion air is piped from the outdoors to the blower inlet.

2) **Side Wall Vent (Positive Pressure)**, uses a vent system certified to UL 1738 for installations in the United States, ULS636 for installations in Canada. Combustion air is obtained from the space in which the unit is installed.

3) **Vertical/Chimney Vent (Negative Pressure)**, uses an approved metal chimney system or masonry chimney. Combustion air is obtained from the space in which the unit is installed.

4) **Outdoor Installation** uses the outdoor option kit.

## DIRECT VENT (POSITIVE PRESSURE)

In this configuration the boiler/water heater blower is used to push the flue products to the outdoors while drawing combustion air from the outdoors. The **Intake Air Option** instructions under the **COMBUSTION AIR & VENTILATION SECTION** must be followed! The vent system must be sized per Table 4.

**Table 4 – Direct Vent Pipe Size, Positive Pressure**

| Model Size | Pipe Diameter in.(mm) |
|---|---|
| 500 | 6 (152) |
| 750 | 8 (203) |
| 1000 | 9 (229) |
| 1250, 1500 | 10 (254) |
| 1750, 1950 | 12 (305) |

**Horizontal Direct Vent Systems – Figures 1 & 2**

The vent materials used in horizontal vent systems must be certified to UL 1738 for installations in the United States, ULS636 for installations in Canada. The certified vent terminal from RBI must also be used.

**The maximum equivalent length for the horizontal vent pipe is 60 feet (19.7 m).** Each 90˚ elbow and the intake air terminal are equal to 10 linear feet (3.3 m) of pipe. To maximize the performance of single wall sheet metal vent systems locate 90˚ elbows as far from the boiler as possible and from one another. For best results, horizontal vent systems should be as short and straight as possible.

The vent system must be both gas tight and watertight. All seams and joints in metal pipes must be joined and sealed in accordance with the vent system manufacturer's instructions.

When horizontal vent runs exceed 5 feet (1.5 m) they must be supported at 3 foot (0.98 m) intervals with overhead hangers. The vent system must be pitched down, toward the vent terminal, 1/4" per foot (21 mm per meter). If any part of a single wall metal vent system passes through an unheated space it must be insulated with insulation rated for 400˚F.

Horizontal vent systems shall terminate at least 4 feet (1.3 m) below, 4 feet (1.3 m) horizontally from or 1 foot (0.23 m) above any door, window or gravity air inlet into any building. It must not terminate less than 4 feet (1.3 m) horizontally from, and in no case above or below, unless a 4 feet (1.3 m) horizontal distance is maintained, from electric meters, gas meters, regulators and relief equipment and not less than 7 feet (2.3 m) from any adjacent public walkway. The bottom of the vent terminal(s) shall be located at least 5 feet (1.5 m) above the air intake terminal(s). Avoid terminal locations likely to be affected by winds, snowdrifts, people and pets.

Protect building materials and vegetation from degradation caused by the flue gases.

**Vertical Direct Vent Systems – Figure 3**

The maximum length for the vertical vent pipe is 30 feet (19.7m) plus two 90˚ elbows. If any part of a single wall metal vent system passes through an unheated space it must be insulated with insulation rated for 400˚F. Structural penetrations must be made using approved fire-stops.

A listed, nonrestrictive vent cap must be used. The top of a vertical vent system must extend at least 5 ½ feet (1.8 m) above the roof surface that it passes through, 4 feet (1.3 m) above the intake air cap, see Figure 3.

In addition the vent system must conform to the dimensions shown in Figure 3. The penetration point in the roof must be properly flashed and sealed.

The vent system must be gas tight. All seams and joints in metal pipes must be joined and sealed in accordance with the vent system manufacturer's instructions.

**Figure 1– Horizontal Air Intake and Venting for a Single Direct Vent System**

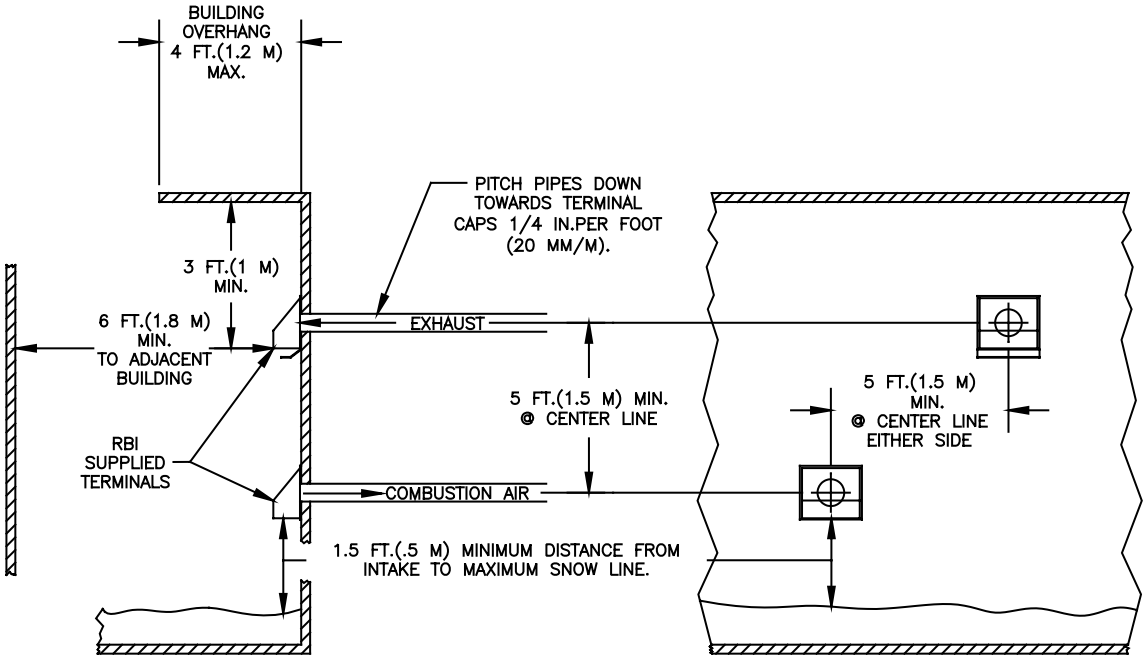



**Figure 2 – Horizontal Air Intake and Venting for Multiple Direct Vent Systems**

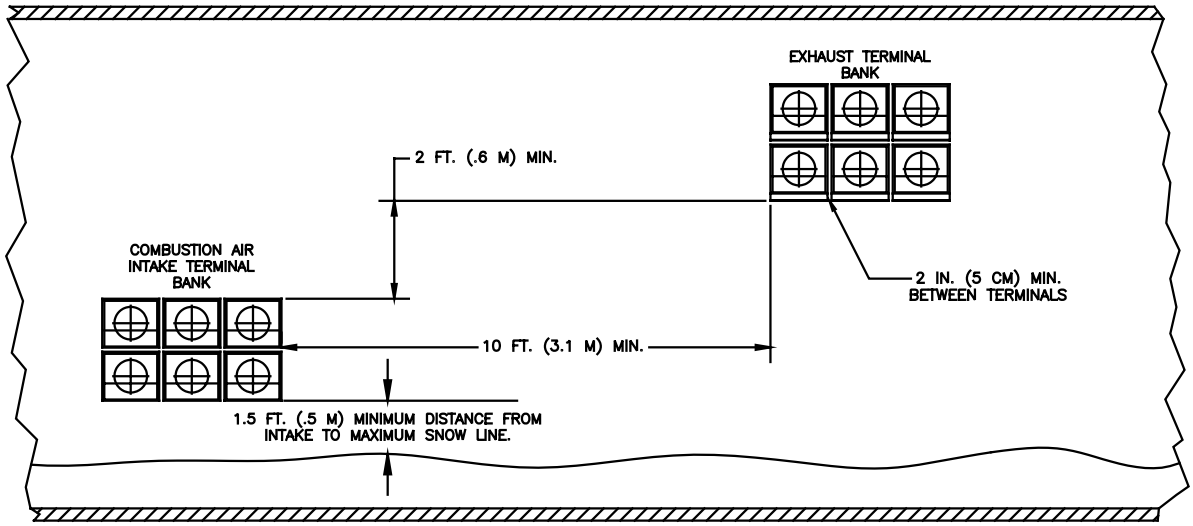
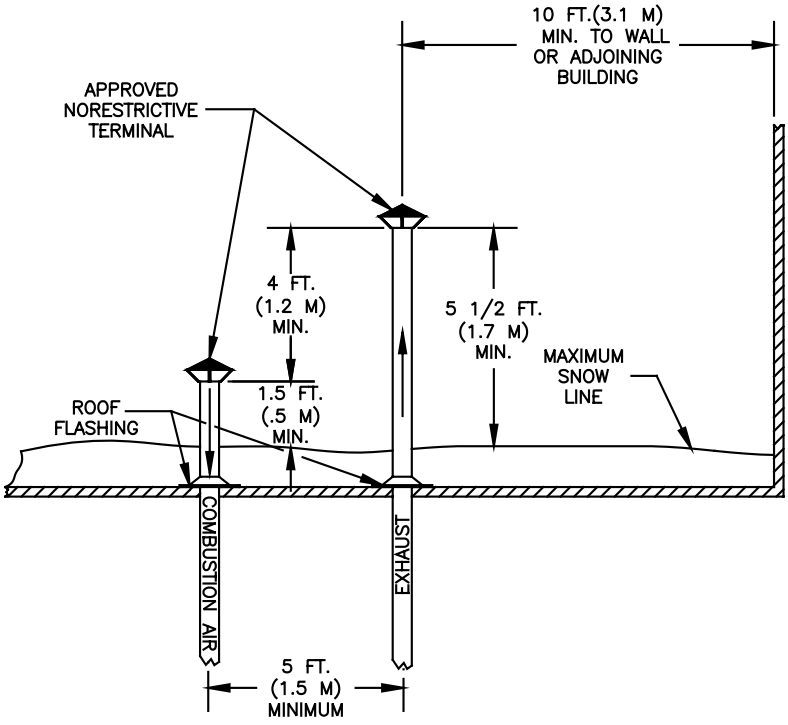
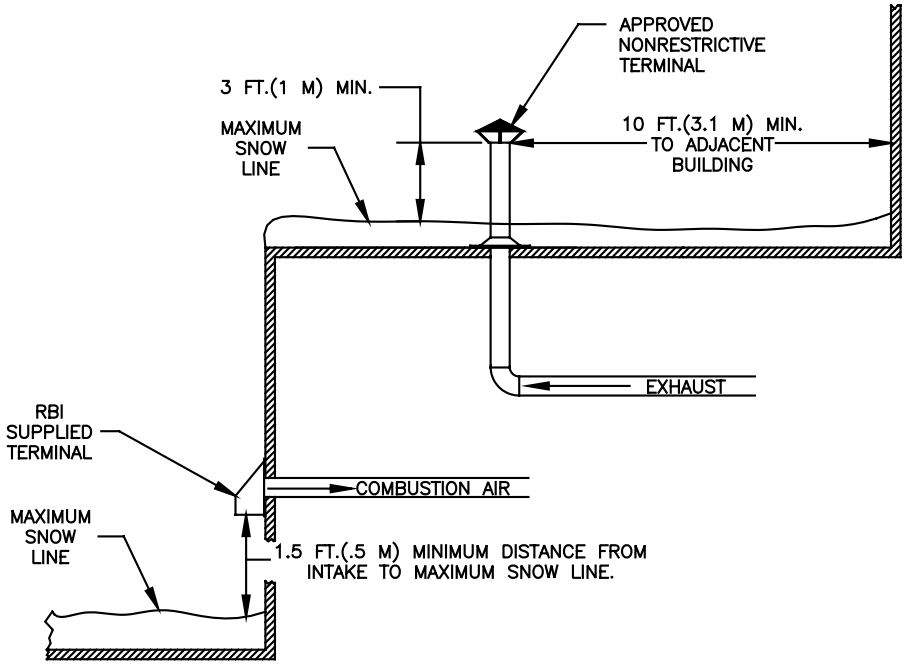


**Figure 3 - Vertical Air Intake and Venting for Direct Vent System**




**Combination Direct Vent Systems – Figure 4**
The boiler/water heater can be vented vertically with the intake air piped horizontally through an outside wall. Follow the instructions in the **Intake Air Option – Horizontal Guidelines** on page 4. Also follow the general instructions in the **COMBUSTION AIR & VENTILATION** and **GENERAL VENTING GUIDELINES** sections.

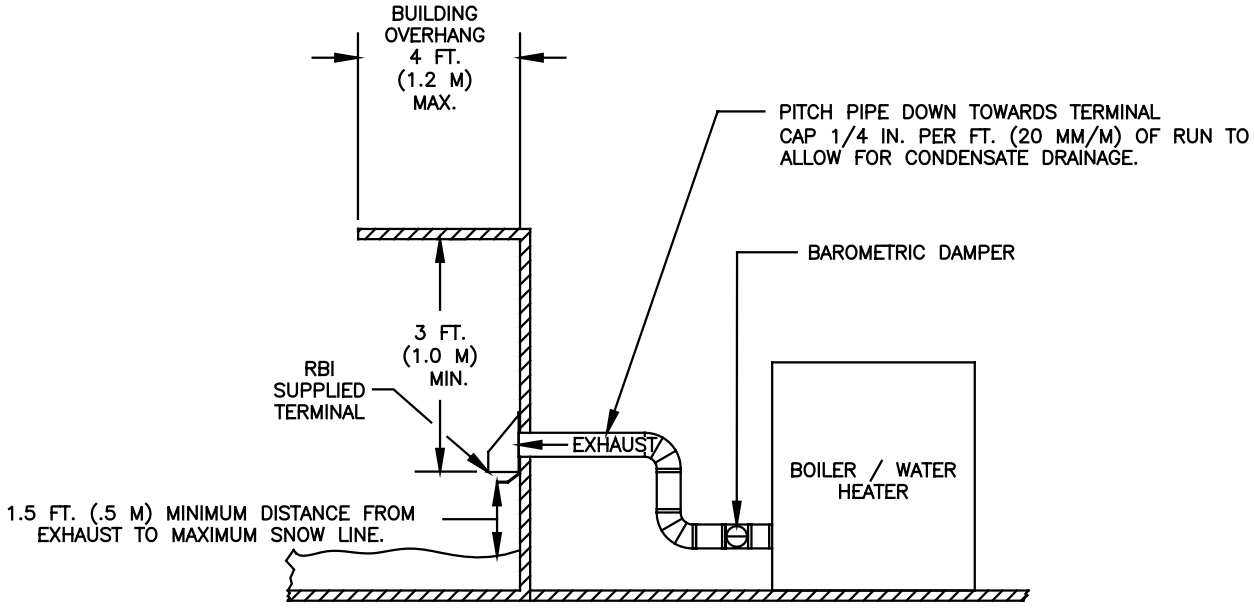
**Figure 4 – Combination Direct Vent Systems**



## SIDE WALL VENT (POSITIVE PRESSURE)

In this configuration the boiler/water heater blower is used to push the flue products horizontally to the outdoors, see Figure 5. The air for combustion is taken from the space in which the unit is installed. The applicable instructions under the **COMBUSTION AIR & VENTILATION SECTION** must be followed! The vent guidelines under the **Horizontal Direct Vent Systems** section must also be followed.

**Figure 5 – Side Wall Venting**




## VERTICAL/CHIMNEY VENT (NEGATIVE PRESSURE)

The Futera II is listed as a Category I appliance when vented vertically into a listed metal chimney system or properly sized masonry chimney, Figures 6 & 7. The chimney must provide a negative pressure of 0.02 to 0.08 in. W.C. at the boiler/water heater flue collar with the unit running. A single acting barometric damper must be attached directly to the flue collar increaser as shown.

**Note: DO NOT remove the damper stops. For proper operation the damper must remain as single acting.**

Multiple Futera II's can be vented into a single vertical chimney provided that the breeching and chimney are properly sized per the latest revision of the National Fuel Gas Code, ANSI Z223.1.

When more than one appliance is connected to the same chimney flue the flue must be large enough to safely vent the combined output of all of the appliances.

WARNING If an appliance using any type of a mechanical draft system operating under positive pressure is connected to a chimney flue, never connect any other appliances to this flue. Doing so can result in excessive levels of carbon monoxide which can cause severe personal injury or death!

**Chimney Inspection & Sizing**

A thorough inspection of the masonry chimney must be performed to ensure that the chimney is clean, properly con-structed and properly sized. Exterior masonry chimneys should not be used unless properly lined to prevent condensation and draft problems. Table 5 lists the equivalent breeching and flue sizes required for the boiler/water heater.

**Table 5 – Equivalent breeching & chimney size, Negative Pressure**

| Model Size | Breech & Flue Diameter in (mm) |
|---|---|
| 500 | 8 (203) |
| 750, 1000 | 10 (254) |
| 1250, 1500 | 12 (305) |
| 1750, 1950 | 14 (356) |

Note: These sizes are based on a 20 foot (6.1m) chimney height.

**Vent Connections**

Locate the boiler/water heater as close to the chimney as possible. Use the shortest, straightest vent connector possible for the installation. If horizontal runs exceed 5 feet (1.5 m) they must be supported at 3 foot (0.9 m) intervals with overhead hangers. Use a type B, single wall stainless or single wall galvanized steel vent pipe the same diameter as the flue collar to connect the boiler/water heater to a masonry chimney. When using a listed metal chimney system use the appropriate vent connector.

The vent system should be sloped up toward the chimney at a minimum rate of 1/4 inch/foot (2 cm/m). On masonry chimneys the connector must terminate flush with the inside of the chimney flue, Figure 7. Fasten each single wall vent connection with at least 3 corrosion resistant sheet metal screws.

WARNING
Never install a vent pipe of a diameter different thatn that of the boiler/water heater's flue outlet. Failure to comply with this warning can result in excessive levels of carbon monoxide which can cause severe personal injury or death.

Always provide a minimum clearance of 6 inches (152 mm) between single wall vent pipe and any combustible materials. Type B1 vent may be used, clearance between it and any combustible material must be as listed.

WARNING
Failure to maintain minimum clearances between vent connectors and any combustible material can result in a fire causing extensive property damage, severe personal injury or death!

**Figure 6 – Vertical Venting with a Metal Chimney System**

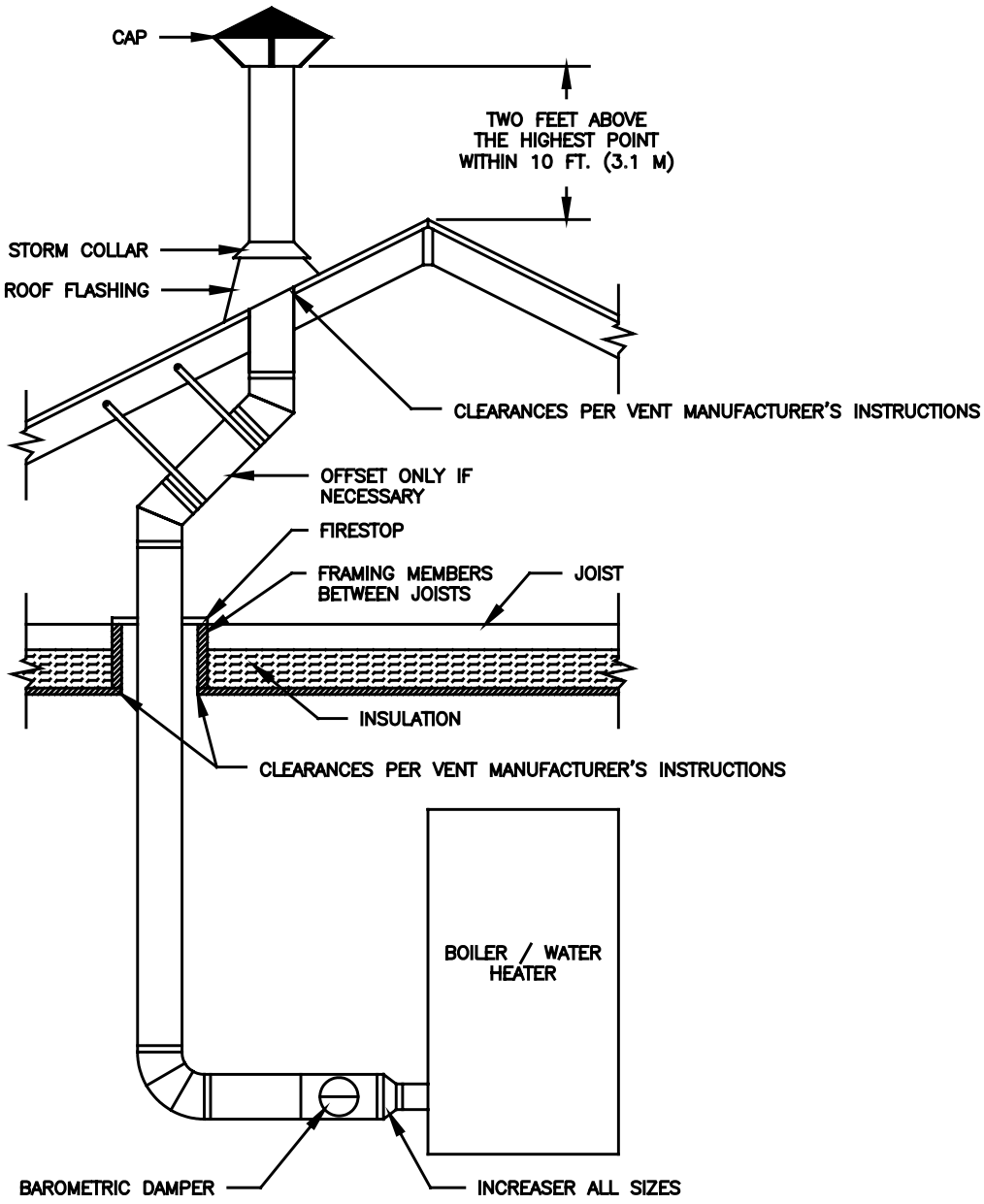
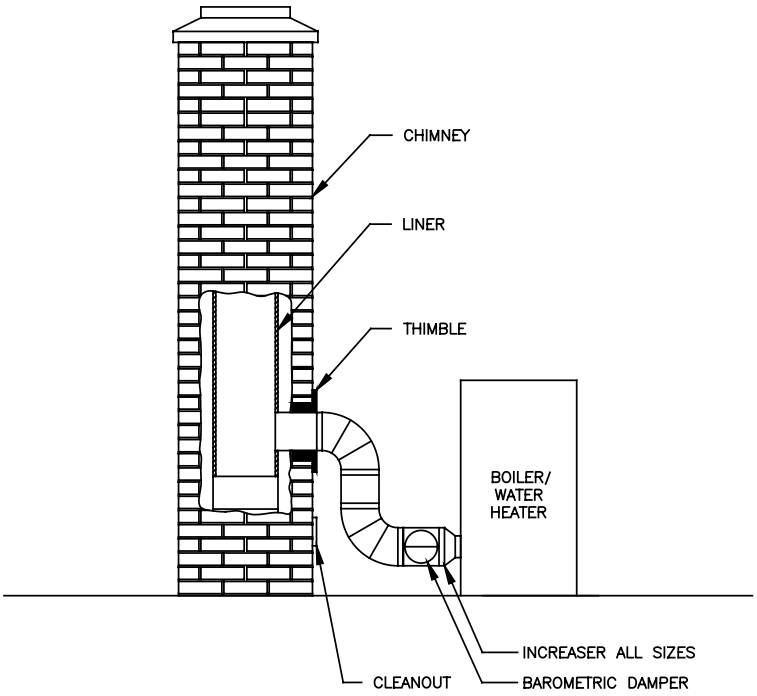


**Figure 7 – Vertical Venting using a Masonry Chimney**

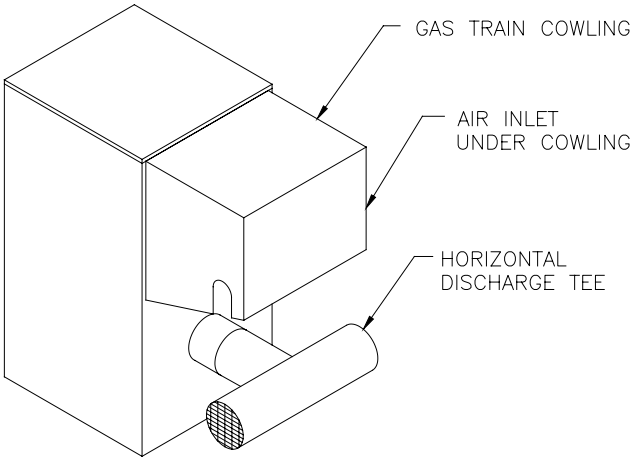



## OUTDOOR VENTING

When installed outdoors the Futera II must be fitted with the factory supplied outdoor hood, air intake adapter with filter and exhaust terminal, see Figure 8.

The boiler/water heater must be at least 10 feet (3.2 m) from any door, window or gravity air inlet into any building and at least 3 feet (0.98 m) from any overhang unless local codes dictate differently.

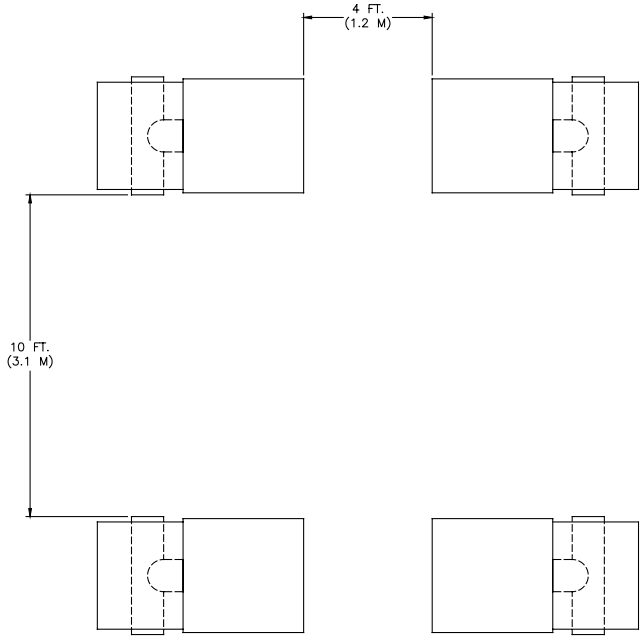
**Figure 8 – Outdoor Venting**




Do not place the boiler/water heater in a location that would subject it to runoff from adjacent buildings.

Multiple outdoor units must be spaced as shown in Figure 9 to prevent flue gasses from one unit from being inngested by an adjacent unit.

**Figure 9 – Multiple Outdoor Units**



## COMMON VENT SYSTEMS

If an existing boiler/water heater is removed from a common venting system, the common venting system may then be too large for the proper venting of the remaining appliances connected to it. At the time of removal of an existing boiler/ water heater, the following steps shall be followed with each appliance remaining connected to the common venting system placed in operation, while the other appliances remaining connected to the common venting system are not in operation.

Au moment du retrait d'une chaudière existante, les mesures suivantes doivent être prises pour chaque appareil toujours raccordé au système d'évacuation commun et qui fonctionne alors que d'autres appareils toujours raccordés au système d'évacuation ne fonction-nent pas: système d'évacuation

a) Seal any unused openings in the common venting system.

Sceller toutes les ouvertures non utilisées du système d'évacuation.

b) Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.

Inspecter de façon visuelle le système d'évacu-ation pour déterminer la grosser et l'inclinaison horizontale qui conviennent et s'assurer que le système est exempt d'obstruction, d'étranglement de fruite, de corrosion et autres défaillances qui pourraient présenter des risques.

c) Insofar as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliance not connected to the common venting system.Turn on any exhaust fans, such as range hoods and bathroom exhaust, so they will operate at maximum speed. Do not operate a summer exhaust fan for a boiler installation. Close fireplace dampers.

Dans la mesure du possible, fermer toutes les portes et les fenêtres du bâtiment et toutes les portes entre l'espace où les appareils toujours raccordés du système d'évacuation sont installés et les autres espaces du bâtiment. Mettre en marche les sécheuses, tous les appareils non raccordés au système d'évacuation commun et tous les ventilateurs d'extraction comme les hottes de cuisinère et les ventilateurs des salles de bain. S'assurer que ces ventilateurs fonctionnent à la vitesse maximale. Ne pas faire fonctionner les ventilateurs d'été. Fermer les registres des cheminées.

d) Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.

Mettre l'appareil inspecté en marche. Suivre les instructions d'allumage. Régler le thermostat de façon que l'appareil fonctionne de façon continue.

e) Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar or pipe.

Faire fonctionner le brûleur principal pendant 5 min ensuite, déterminer si le coupe-tirage déborde à l'ouverture de décharge. Utiliser la flamme d'une allunette ou d'une chandelle ou la fumée d'une cigarette, d'un cigare ou d'une pipe.

f) After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous condition of use.

Une fois qu'il a été d éterminé, selon la métode indiquée ci-dessus, que chaque appareil raccordé au système d'évacuation est mis à l'air libre de façor adéquate. Remettre les portes et les fenêtres, les ventilateurs, les registres de cheminées et les appareils au gaz à leur position originale.

g) Any improper operation of the common venting system should be corrected so the installation conforms with the National Fuel Gas Code, ANSI Z223.1/NFPA 54. When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in Appendix F in the National Fuel Gas Code, ANSI Z223.1/ NFPA 54 and or CAN/CGA B149 Installation Codes.

Tout mauvais fonctionnement du systéme d'évacu-tion commun devrait étré corrigé de façor que l'installation soit conforme au National Fue Gas Code, ANSI Z223.1/NFPA 54 et (ou) aux codes d'installation CAN/ CGA-B149. Si la grosseur d'une section du système d' évacuation doit étré modifiée, le système devrait étré modifié pour respecter les valeurs minimales des tableaux pertinents de l'appendice F du National Fuel Gas Code, ANSI Z223.1/ NFPA 54 et (ou) des codes d'installation CAN/CGA-B149.

## GENERAL PIPING REQUIREMENTS

**CAUTION**

**Improper piping of this boiler/water heater will void the manufacturer's warranty and can cause boiler failure resulting in flooding and extensive property damage! Excessive water hardness causing scaling in the copper heat exchanger tubes is NOT covered under the manufacturer's warranty, see Table 7. Excessive pitting and erosion of the internal surface of the copper heat exchanger tubes is NOT covered under the manufacturer's warranty if the result of high water flow rates, see Table 7. Return water temperatures below 130˚F will result in heat exchanger damage from exces-sive condensation voiding the manufacturer's warranty, see Primary / Secondary Piping below.**

**NOTE: Shut off valves and unions should be installed at the inlet and outlet connections of the boiler/hot water heater to provide for isolation of the unit should servicing be necessary.**

**Freeze Protection**
This boiler/water heater is CSA designed certified for outdoor installation. Outdoor installations in areas where the danger of freezing exists are not recommended unless proper freeze protection is provided. The following precautions MUST be observed:

1. A continuous flow of water through the unit MUST be maintained! The pump responsible for flow through the boiler/water heater must run continuously!

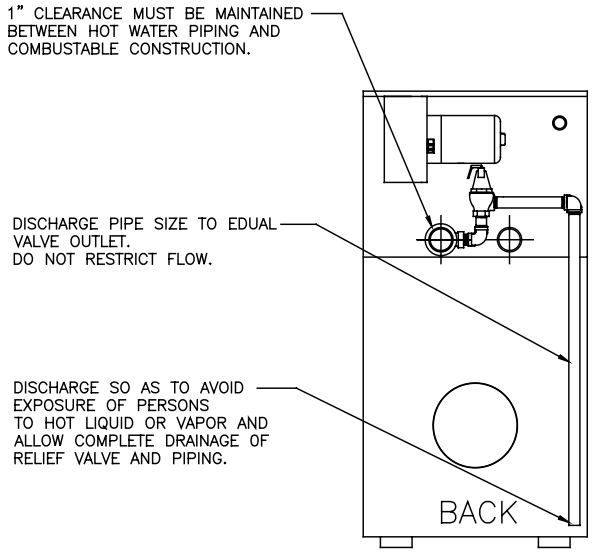
2. An ethylene glycol/water mixture suitable for the minimum temperature that the unit will be exposed to must be used. The pump must be capable of producing 15% more flow and overcoming a 20% increase in head loss. Domestic water systems must be isolated from the water heater by the use of a heat exchanger or other approved method.

3. If the unit must be shut off for any reason the electric, gas and water supplies MUST be shut off and the unit and its pump completely drained.

**CAUTION**
**Improper outdoor installation of this unit can cause boiler failure voiding the manufacturer's warranty!**

**Relief Valve**
Pipe the discharge of the pressure relief valve as shown in Figure 10.

**Figure 10 – Relief Valve Piping**




WARNING
Never install any type of valve between the boiler/ water heater and the relief valve or an explosion causing extensive property damage, severe personal injury or death may occur!

**Flow Switch**
The flow switch supplied with the boiler/water heater must be wired to the terminal strip in the control panel to prevent the boiler from firing unless there's adequate water flow through the unit. The flow switch must be installed in the supply piping adjacent to the boiler outlet connection.

**CAUTION**
**Failure to properly install the flow switch may result in damage to the boiler/water heater heat exchanger voiding the warranty!**

## HEATING SYSTEM PIPING

**General Piping Requirements**
All heating system piping must be installed by a qualified technician in accordance with the latest revision of the ANSI/ASME Boiler and Pressure Vessel Code, Section IV, and ANSI/ASME CSD-1, Standard for Controls and Safety Devices for Automatically Fired Boilers. All applicable local codes and ordinances must also be followed. A minimum clearance of 1" must be maintained between heating system pipes and all combustible construction. All heating system piping must be supported by suitable hangers not the boiler. The thermal expansion of the system must be considered when supporting the system. A minimum system pressure of 12 psig must be maintained.

**Heating Boiler Piping Connections**
The supply and return connections should be sized to suit the system, see Table 6.

**Table 6 – Supply & Return Pipe Sizing**

| Model Size | Supply Size (in) | Return Size (in) |
|---|---|---|
| 500 thru 1000 | 2" NPT | 2" NPT |
| 1250 thru 1950 | 2 1/2" NPT | 2 1/2" NPT |

**Pump Requirements**
This low mass boiler requires a continuous minimum water flow for proper operation. The system pump must be sized to overcome the head loss of the boiler and the heating system in order to achieve the required temperature rise. Table 7 provides the heat exchanger pressure drop and temperature rise figures. The temperature rise across the boiler must never exceed 35˚F (17˚C). The pump should be wired to run continuously unless the optional pump delay is installed. The adjustable pump delay turns the pump on each time the burner fires and runs the pump for 6 to 600 seconds after the call for heat is satisfied.

**CAUTION**
**A temperature rise listed in Table 7 indicates that the flow rate through outside of the range the heat exchanger is incorrect which will damage the heat exchanger voiding the warranty! The maximum allowable flow rate through a Futera II boiler is 75 GPM on 500 through 1000 models and 110 GPM for 1250 through 1950 models. If higher flow rates are required the optional Cupro-Nickel heat exchanger should be considered.**

**Table 7 – Temperature Rise Table**

| Temperature Rise Across Heat Exchanger | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model Size | 20˚F | | | | 25˚F | | | | 30˚F | | | |
| | Flow | | Pressure Drop | | Flow | | Pressure Drop | | Flow | | Pressure Drop | |
| | GPM | L/s | feet | kPa | GPM | L/s | feet | kPa | GPM | L/s | feet | kPa |
| 500 | 42 | 2.6 | 1.0 | 2.9 | 34 | 2.1 | 0.7 | 2.0 | | | | |
| 750 | 64 | 4.0 | 2.4 | 7.2 | 51 | 3.2 | 1.5 | 4.6 | 42 | 2.6 | 1.1 | 3.3 |
| 1000 | 85 | 5.4 | 4.0 | 12.0 | 68 | 4.3 | 2.6 | 7.7 | 57 | 3.6 | 2.2 | 6.6 |
| 1250 | 106 | 6.7 | 3.6 | 11.0 | 85 | 5.4 | 2.3 | 6.9 | 71 | 4.5 | 1.7 | 5.1 |
| 1500 | 127* | 8.0 | 5.6 | 17.0 | 102 | 6.4 | 3.6 | 10.8 | 85 | 5.4 | 2.6 | 7.8 |
| 1750 | 149* | 9.4 | 8.3 | 25.0 | 119 | 7.5 | 5.3 | 15.8 | 99 | 6.2 | 3.9 | 12 |
| 1950 | 166* | 10.0 | 10.4 | 30.0 | 133 | 8.4 | 6.6 | 19.9 | 110 | 7.1 | 5.6 | 17 |

* Exceeds maximum recommended flow rate. Use a higher temperature rise or consult factory.

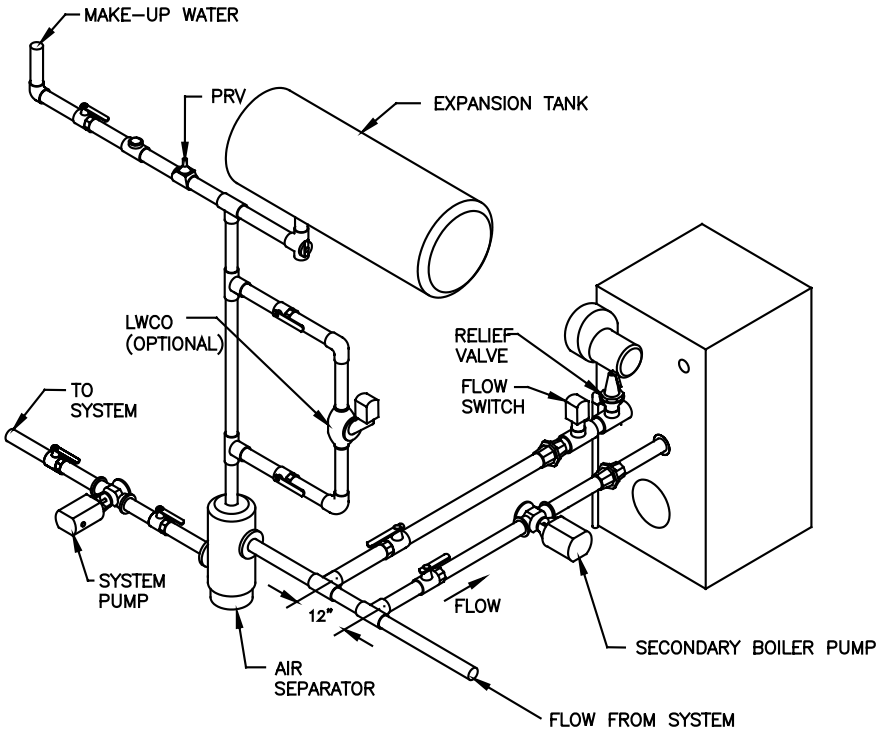
**Low Water Cutoff**
If a boiler is installed above any radiation elements it must be fitted with a low water cutoff device.

**Expansion Tank & Air Separator**
An expansion tank or other means to control thermal expan-sion must be installed in the heating system. An expansion tank must be installed close to the boiler on the suction side of the pump. An air scoop and automatic air vent must also be installed to eliminate air trapped in the system.

**Primary/Secondary Piping**
Boilers connected to heating systems using zone valves, zone pumps, or systems that have excessive flow rates or return water temperatures less than 110˚F (43˚C) must be isolated from these systems to protect the boiler.

**Variable Water Flows**
Figure 11 shows a typical primary/secondary piping system. A dedicated pump is used to maintain a constant water flow through the boiler. This secondary pump is sized to overcome the head loss of the boiler and secondary piping system while supplying the flow rate required to maintain the desired temperature rise across the boiler. The primary pump is sized to provide the required flow to the heating system. The secondary piping connections to the primary system piping must not be more than 12" apart to ensure zero pressure drop in the primary system, see Figure 11.

**Figure 11 – Typical Primary/Secondary Piping System**

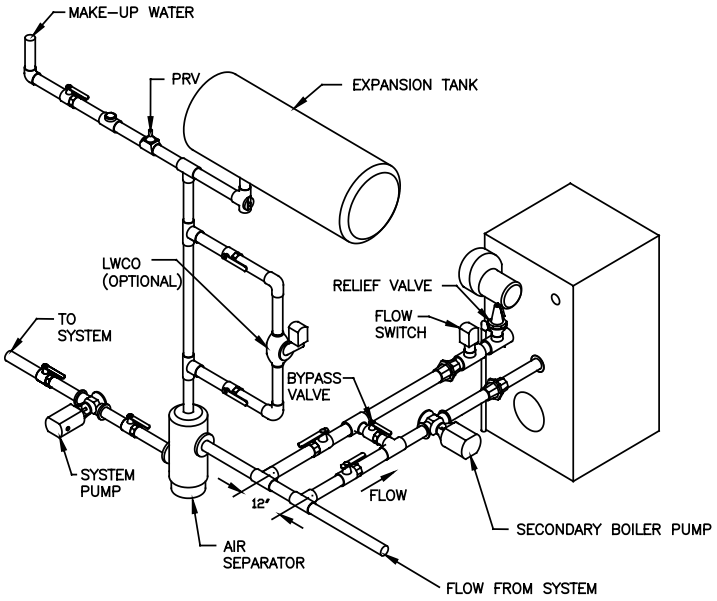


**Low Return Water Temperatures**

To prevent the problems associated with condensation of the products of combustion due to low return water temperatures a primary/secondary piping system with a bypass and bypass valve must be installed, see Figure 12. The bypass and bypass valve must be sized the same as the secondary piping. A balancing valve must also be installed in the supply side of the secondary piping downstream of the bypass.

The balancing valve should be adjusted to divert some of the heated discharge water into the return water until the required inlet water temperature is achieved. The primary and secondary pumps should be sized to provide the required flow through each system. The secondary piping connections to the primary system piping must not be more than 12" apart to ensure zero pressure drop in the primary system, see Figure 12.

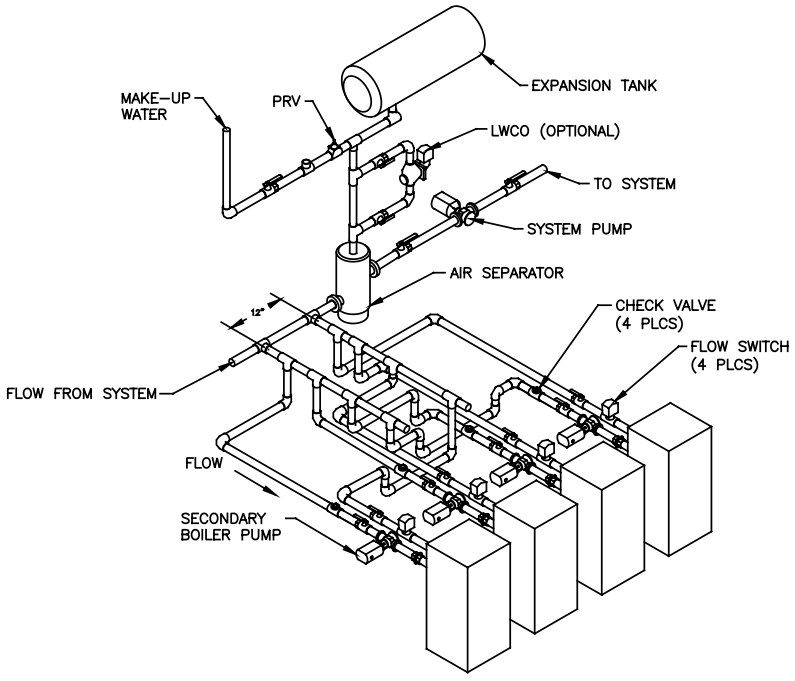
**Figure 12 – Low Temperature Piping**




**Multiple Boiler Systems**

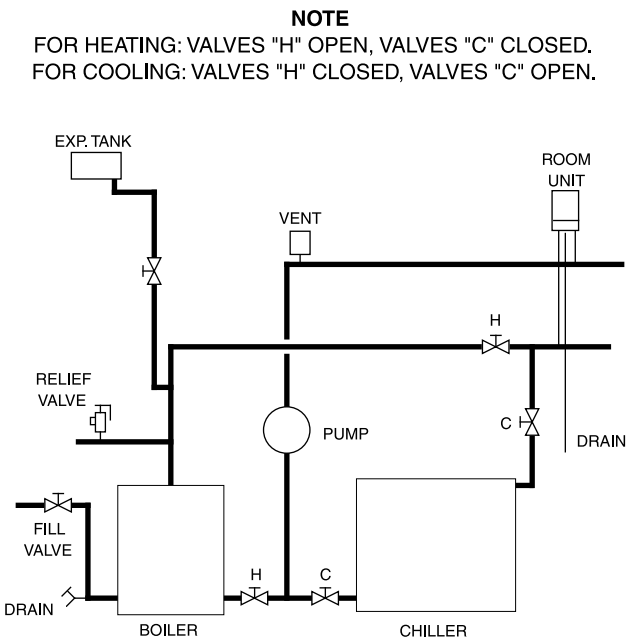
Systems using multiple boilers can also be installed using a primary/secondary manifold system, Figure 13.

**Figure 13 – Multiple Boiler Piping**



**Piping For Use With Cooling Units**
The boiler, when used in connection with a refrigeration system, must be installed so the chilled medium is piped in parallel with the boiler. Appropriate valves must be used to prevent the chilled water from entering the boiler, see Figure 14.

**Figure 14 – Chilled Medium Piping**




When a boiler is connected to a heating coil that may be exposed to refrigerated air from an air handling device, the piping system must be equipped with flow-control valves or some other automatic means of preventing gravity circulation of the boiler water during the cooling cycle.

## DOMESTIC WATER SUPPLY PIPING

**CAUTION**
**Proper controls must be used to prevent water supplied for domestic use from exceeding 130˚F (54˚C) or a scald injury will occur! When higher water temperatures are required for appliances such as a dishwasher, a mixing valve or some other tempering means must be installed. Households with small children may require water temperatures less than 120˚F (49˚C). Local codes must be complied with!**

**General Piping Requirements**
Ensure that the water heater is equipped with bronze headers. Piping and components connected to the water heater must be suitable for use with potable water. The water heater must not be connected to any heating system piping or components previously used with a non-potable water heating appliance. No toxic chemicals, such as those used for boiler treatment, are to be introduced into the potable water used for space heating. If a hot water storage tank is used in the system it must be equipped with a temperature and pressure relief valve that complies with ANSI Z21.22 or CAN-4.4 and CAN-4.6.

**NOTE:**
**The storage tank must be located as close to the water heater as possible to prevent excessive head loss which will reduce flow.**

**Water Chemistry**
The required temperature rise across the water heater is based on water having a hardness between 8 and 18 grains per gallon with a level of dissolved solids not exceeding 350 ppm. Water having a hardness less than 8 grains can cause excessive corrosion of the heat exchanger. Water that has a hardness greater than 18 grains per gallon and/or a level of dissolved solids exceeding 350 ppm will require a recalculation of the pump size and temperature rise. A Cupro-Nickel heat exchanger may also be required. The manufacture should be consulted when these water conditions are encountered.

**Expansion Tank**
An expansion tank or other means to control thermal expansion must be installed in the water heating system if back flow prevention devices are installed.

**Pump Requirements**
This low-mass water heater requires a continuous minimum water flow for proper operation. The factory supplied circulating pump has been sized to overcome the head loss of the water heater plus a 30 foot piping loop under normal water conditions.

Table 7 provides the heat exchanger pressure drop chart and temperature rise table. The temperature rise across the water heater must never exceed 30˚F (17˚C).

**CAUTION**
**The pump should be wired to run continuously unless the optional pump delay is installed. If the pump delay is used a tank-mounted aquastat must be wired to the remote operator terminals in the control box and adjusted so it acts as the primary operator.**

**Cold Water Supply**
The cold water supply must be piped to the water heater's outlet piping between the water heater and the hot water storage tank. This will prevent untempered water from entering the water heater, see the TEMPERATURE RISE CONTROL section below. Two typical water heating systems are shown in Figures 15 & 16.

**Temperature Rise Control**
Water returned to the water heater inlet must not be less than 130˚F (54˚C) or excessive condensation of the products of combustion will damage the water heater voiding the warranty. The method outlined below can be employed to prevent this condition from occurring.

A balancing valve should be installed on the outlet side of the water heater for purposes of adjusting the flow rate through the heat exchanger. Thermometers are installed on both the inlet and outlet of the water heater for determining the temperature rise through the unit.

The proper velocity through the water heater must be maintained in accordance with Table 7 for efficient operation and long life. If the temperature rise through the water heater is lower than recommended the water velocity is too high. Premature erosion of the heat exchanger will occur. Conversely, if the temperature rise is higher than recommended in Table 5 the flow rate is too low. Scaling and softening of the heat exchanger will occur.

**Thermostatic Mixing Valve– Water Above 140˚F (60˚C)** Water can be stored a temperatures above 140˚F (60˚C) provided that a thermostatically controlled mixing valve is used to temper the hot water to an acceptable temperature before it's supplied for domestic use. The mixing valve MUST be set to prevent a scald injury from occurring, see the caution against scalding above. Storage of water for domestic use above 140˚F (60˚C) will provide an increased quantity of tempered water and help prevent the growth of water born bacteria.

**Figure 15 – Typical Water Heating Piping**

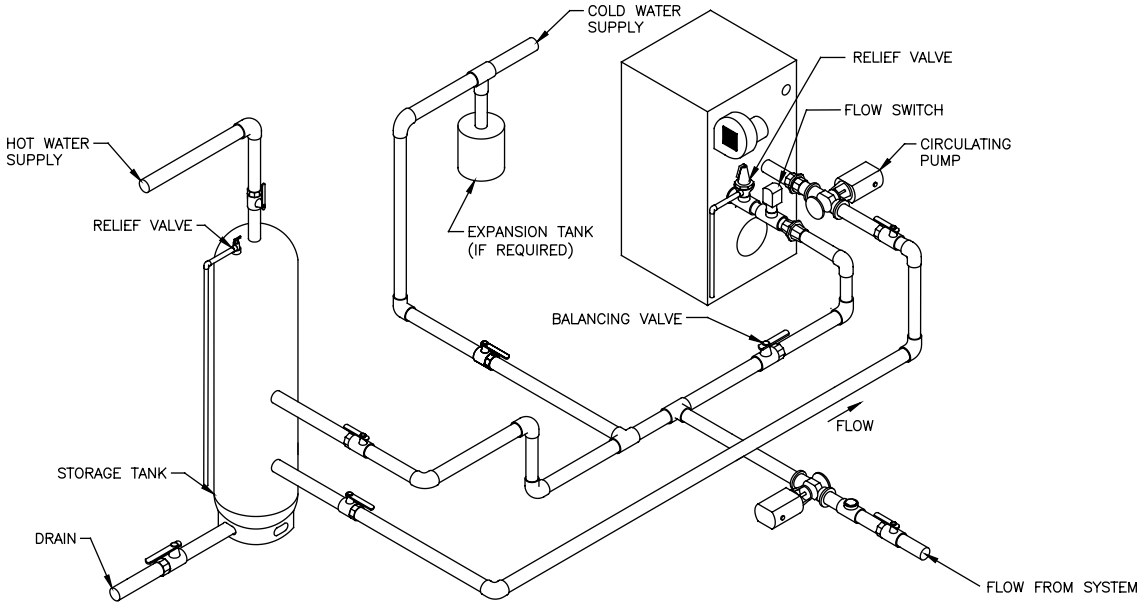
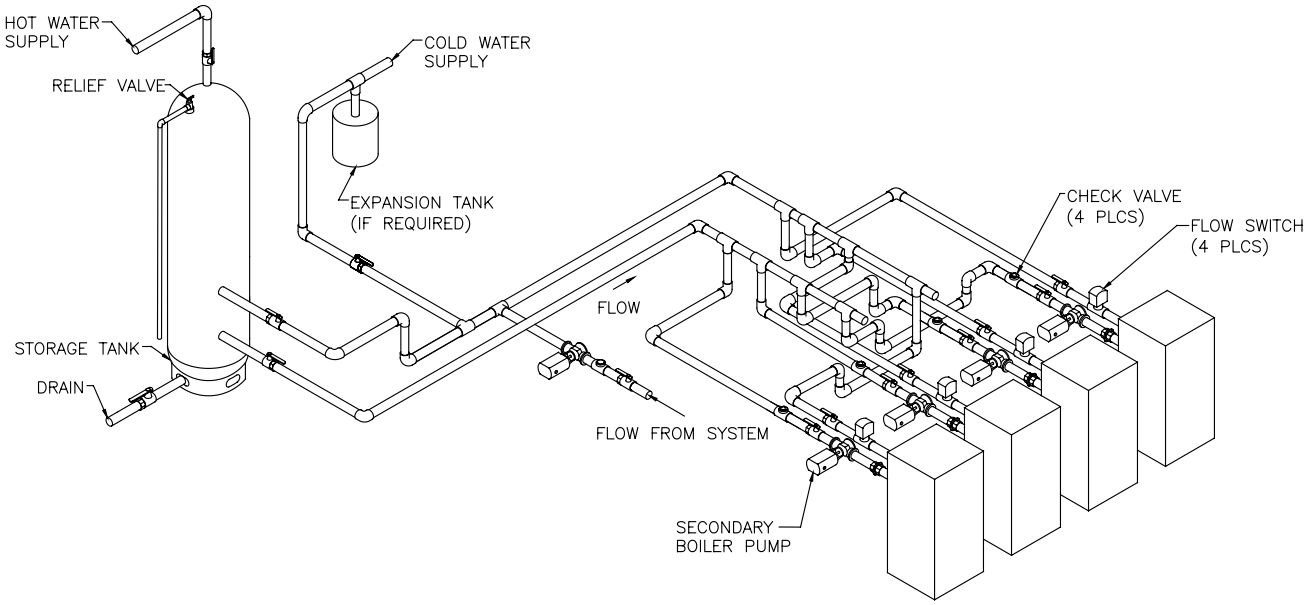



**Figure 16 – Multiple Water Heating Piping**



## GAS SUPPLY PIPING

WARNING
Check the boiler/water heater rating plate to make sure that the boiler/water heater is for the type of gas that will be used. If it isn't, do not connect the boiler/water heater to the gas supply. Failure to comply with this warning can result in extensive property damage, severe personal injury or death!

The Futera II comes from the factory ready to be piped to the gas supply. If for any reason the boiler/water heater is not for the type of gas available at the installation site, call your RBI Water Heaters representative to resolve the problem.

Table 8 should be used to ensure that the gas supply piping is sized properly. If more than one appliance is supplied by the same supply pipe, the piping must be sized based on the maximum possible demand. Do not neglect the pressure drop due to pipe fittings. Table 8 should be used in conjunction with Table 9 to ensure that the gas supply piping has the capacity to meet the demand.

Figure 17 depicts the proper way to connect the boiler/water heater to the gas supply piping. The manual shut-off valve MUST be installed in the supply piping. It should be installed 5 feet above the floor where required by local codes. Provide a sediment trap at the bottom of the vertical section of the gas supply pipe upstream of the gas controls.

A ground joint union should be installed between the boiler gas controls and the supply piping. Each of these items are needed to ensure long life and ease of servicing. Always use a pipe sealant that is suitable for use with LP gas.

**Table 8 – Gas Pipe Capacity**

| Maximum pipe capacity in ft³/hr based on 0.60 specific gravity gas at a pressure of 0.5 psig or less and a 0.3" WC pressure drop. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Nominal Iron Pipe Size, (in) | Pipe length in feet | | | | | | | | |
| | 10 | 20 | 30 | 40 | 50 | 60 | 80 | 100 | 150 |
| | Maximum gas volume of pipe, (ft³/hr) | | | | | | | | |
| 1" | 520 | 350 | 285 | 245 | 215 | 195 | 170 | 150 | 120 |
| 1 1/4" | 1050 | 730 | 590 | 500 | 440 | 400 | 350 | 305 | 250 |
| 1 1/2" | 1600 | 1100 | 890 | 760 | 670 | 610 | 530 | 460 | 380 |
| 2" | 3050 | 2100 | 1650 | 1270 | 1270 | 1150 | 990 | 870 | 710 |

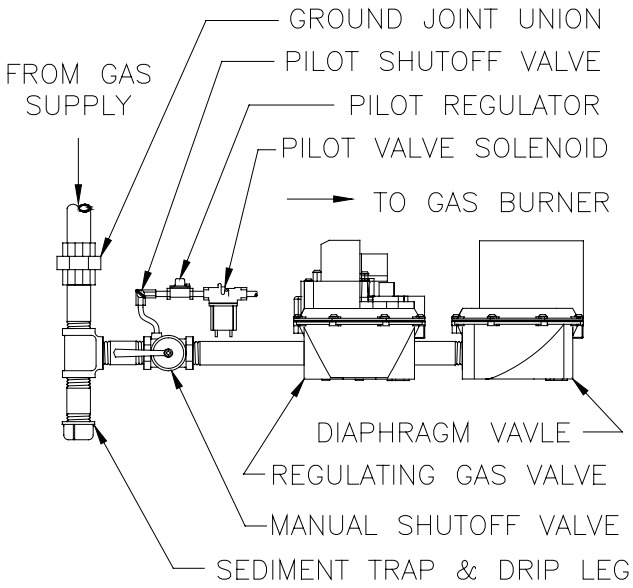
Note: Multiply the gas volume by 0.62 for propane flow capacity in ft3/hr. Multiply the propane flow capacity by 2500 Btu/ft3 to determine the propane Btu/hr capacity for a given pipe size and length.

**Table 9 – Equivalent Pipe Length Chart**

| Nominal Iron Pipe Size, (in) | Type of pipe fitting | | | |
|---|---|---|---|---|
| | 90˚ Elbow | Tee[1] | Gate Valve[2] | Gas Clock[2] |
| | Equivalent pipe length, (ft) | | | |
| 1" | 2.6 | 5.2 | 0.6 | 1.5 |
| 1 1/4" | 3.5 | 6.9 | 0.8 | 1.9 |
| 1 1/2" | 4.0 | 8.0 | 0.9 | 2.3 |
| 2" | 5.2 | 10.3 | 1.2 | 3.0 |

Notes: 1. For flow through branch.
2. For flow at full open.

**Figure 17 – Gas Supply Piping**




**CAUTION**
**Always use a wrench on the gas valve body when making gas connections to it. Never over-tighten the piping entering the gas valve body or gas valve failure may result!**

When applicable, provisions for vent, bleed and gas relief lines must be made in accordance with the latest revision of ANSI Z223.1.

Safe lighting and other performance criteria were met with the gas manifold and control assembly provided on the boiler. All gas connections MUST be leak tested before putting the boiler into operation.

WARNING
Never use an open flame to test for gas leaks. Always use an approved leak detection method. Failure to comply with this warning can cause extensive property damage, severe personal injury or death!

Whenever the gas supply piping is pressure tested the boiler/water heater gas controls must be protected. If the test pressure is equal to, or less than 1/2 psig (3.5 kPa) isolate the boiler/water heater by closing it's manual shut off valve, see Figure 16. If the test pressure is greater than, or equal to 1/2 psig (3.5 kPa), disconnect the boiler/water heater and its individual shut-off valve.

## ELECTRICAL WIRING

**CAUTION**
**Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation! Verify proper operation after servicing.**

**ATTENTION.**
**Au moment de l'entretien des commandes, étiquetez tous les fils avant de les débrancher. Des erreurs de câblage peuvent entraîner un fonctionnement inadéquat et dangereux. S'assurer que l'appareil fonctionne adéquatement une fois l'entretirn terminé.**

**Electrical Power Connections**
The electrical connections to this boiler/water heater must be made in accordance with all applicable local codes and the latest revision of the National Electrical Code, ANSI / NFPA-70. Installation should also conform with CSA C22.1 Canadian Electrical Code Part I if installed in Canada. Install a separate 120 volt 15 amp circuit for the boiler/water heater. A properly rated shut-off switch should be located at the boiler/water heater. The boiler/water heater must be grounded in accordance with the authority having jurisdiction, or if none, the latest revision of the National Electrical Code, ANSI/NFPA-70.

Line voltage field wiring of any controls or other devices must conform to the temperature limitation of type T wire at 95°F (35°C) above room temperature. Use copper conductors with a minimum size of #14 awg. Use appropriate wiring materials for units installed outdoors.

Refer to the wiring diagram supplied with the boiler/water heater for proper wiring connections.

## BOILER/WATER HEATER OPERATION

WARNING
Before proceeding read and fully understand the instructions contained in this manual. Do not attempt to operate this boiler/water heater if it has not been installed in accordance with the guidelines set forth in this manual. Failure to comply with this warning can result in extensive property damage, severe personal injury or death!

Should overheating occur or the gas supply fail to shut off, turn off the manual gas control valve to the appliance. Do Not interrupt water flow through the boiler/water heater.

En cas de surchauffe ou si l'alimentation en gaz ne s'arrête pas, fermez manuellement le robinet d'arrêt de l'admission de gaz.

**Hydronic Heating Boilers**
Open the make-up water valve and slowly fill the boiler and all of the radiation with water. Ensure that all bleed and drain valves are closed.

Adjust the make-up water pressure regulator so a minimum 12 psig system pressure is maintained at the highest point in the system piping. If a make-up water pump is used adjust it to maintain a minimum 12 psig system pressure.

Open the system bleed and drain valves, one at a time, to purge the air trapped in the heating system piping.

With the boiler off, run the system pump for at least 30 minutes and bleed the system piping using the bleed valves. If strainers are used in the system piping the make- up water valve should be closed and the strainers checked and cleaned.

The system expansion tank should be checked to ensure that the correct water level in the tank is maintained. The tank should less than half full of water with the system full and adjusted to the correct operating pressure.

Start the boiler as described in the LIGHTING INSTRUCTIONS below. Run the boiler for at least an hour. The system pump(s) and all radiation units must be operated during this time. Ensure that the make-up water valve is open.

Shut the boiler off and open the bleed valves to purge the air trapped in the heating system piping. Close the make-up water valve and check and clean the strainers and make-up water pressure reducing valve.

Open the make-up water valve and adjust the system pressure if necessary.
The system should be checked and bled after three days of operation.

## OPERATING INSTRUCTIONS

**FOR YOUR SAFETY READ BEFORE OPERATING.**
**POUR VOTRE SÉCURITÉ LISEZ AVANT DE METTRE EN MARCHE**

A. This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.

   Cet appareil est muni d'un dispositif d'allumage qui allume automatiquement la veilleuse. Ne tentez pas d'allumer la veilleuse manuellement.

B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

   WHAT TO DO IF YOU SMELL GAS
   - Do not try to light any appliance.
   - Do not touch any electric switch ; do not use any phone in your building.
   - Immediately call your gas supplier from a neighbor's phone. Follow the gas suppliers instructions.
   - If you cannot reach your gas supplier, call the fire department.

   AVANT DE FAIRE FONCTIONNER, reniflez tout autour de l'appareil pour déceler une odeur de gaz. Reniflez près du plancher, car certains gaz sont plus lourds que l'air et peuvent s'accumuler au niveau du sol.

QUE FAIRE SI VOUS SENTEZ UNE ODEUR DE GAZ:
- Ne pas tenter d'allumer d'appareil.
- Ne touchez à aucun interrupteur; ne pas vous servir des téléphones se trouvant dans le bâtiment.
- Appelez immédiatement votre fournisseur de gaz depuis un voisin. Suives les instructions du fournisseur.
- Si vous ne pouvez rejoindre le fournisseur, appelez le service de incendies.

C) Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control that has been under water.

N'utilisez pas cet appareil s'il a été plongé dans l'eau, même partiellement. Faites inspecter l'appareil par un tecnicien qualifié et remplacez toute partie du système de contrôle et toute commande qui ont été plongés dans l'eau.

**CAUTION**
**To prevent being burned, stand clear of the boiler during ignition and don't touch any hot metal parts!**

**Operating Instructions**
1. STOP! Read the safety information above. If, at any time, the appliance will not operate properly, follow the instructions "TO TURN OFF GAS TO APPLIANCE " and call your service technician or gas supplier.
2. Set the operating control or thermostat to off or its lowest setting.
3. Turn off all electric power to the appliance.
4. Close the manual main and pilot gas shut-off valves.
5. Wait five (5) minutes to clear out any gas.
6. Connect a manometer having a minimum capacity of 20" WC to the outlet pressure port of the gas valve. Make sure that the gas supply piping has been purged of air and that all gas joints up to the gas valve have been thoroughly checked for leaks.
7. Open the manual pilot valve.
8. Turn on all electric power to the boiler.
9. Set the operating control or thermostat to the desired setting.
10. The pilot should automatically light. Do not try to light the pilot by hand!
11. With the pilot lit, open the main gas shut-off valve.
12. The burner should light with proper boiler operation.

INSTRUCTIONS DE MISE EN MARCHE
1. ARRÊTEZ! Lisez les instructions de sécurité sur la portion supérieure de cette étiquette.
2. Réglez le thermostat à la température la plus basse.
3. Coupez l'alimentation électrique de l'appareil.
4. Cet appareil est muni d'un dispositif d'allumage qui allume automatiquement la veilleuse. Ne tentez pas d'allumer la veilleuse manuellement.
5. Fermer la vanne manuelle d'arrêt d'alimintation de gaz.
6. Attendre cinq (5) minutes pour laisser échapper tout le gaz. Reniflez tout autour de l'appareil, y compris près du plancher, pour déceler une odeur de gaz. Si vous sentez une odeur de gaz, ARRÊTEZ! Passez à l'étape B des instructions de sécurité sur la portion supérieure de cette étiquette. S'il n'y a pas d'odeur de gaz, passez à l'étape suivante.
7. Ouver la vanne manuelle d'arrêt d'alimintation de gaz.
8. Mettez l'appareil sous tension.
9. Réglez le thermostat à la température désirée.
10. Si l'appareil ne se met pas en marche, suivez les instructions intitulées «Comment couper l'admission de gaz de l'appareil» et appelez un technicien qualifié ou le fournisseur de gaz.

TO TURN OFF GAS TO APPLIANCE
1. Set the operating control or thermostat to its lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Close the manual main and pilot gas shut-off valves.

COMMENT COUPER L'ADMISSION DE GAZ DE L'APAREIL
1. Réglez le thermostat à la température la plus basse.
2. Coupez l'alimentation électrique de l'appareil s'il faut procéder à l'entretien.
3. Fermer la vanne manuelle d'arrêt d'alimintation de gaz.

## CHECKING, ADJUSTMENT & OPERATION

**Pilot Regulator Settings**
Confirm that the pilot pressure regulator is set within one turn of its maximum setting for natural gas. For LP gas the pilot pressure regulator should be set within one turn of its minimum setting.

**Spark Gap**
With the main and pilot gas manual valves in the closed position energize the unit. Observe the trial for ignition to confirm that the spark is strong and continuous. If not check and adjust the spark gap as shown in Figures 18 &19.

**Figure 18 – Spark Gap & Pilot Flame**

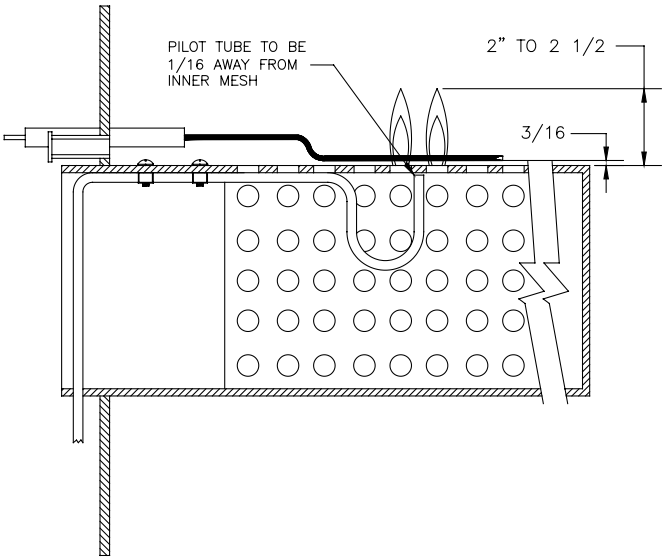
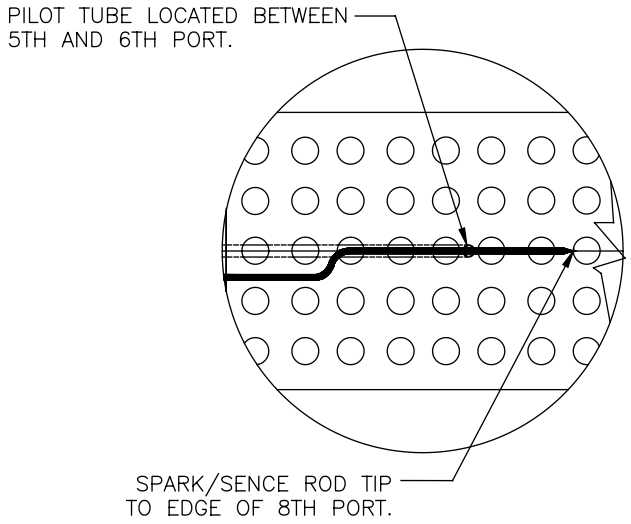


**Figure 19 – Spark Rod Position Detail**




**Pilot Operation**

With the manual main gas valve and manual pilot gas valve closed energize the unit and allow it to try for ignition until it goes into flame failure. The trial for ignition indicator light should illuminate immediately after the trial for ignition starts and stay on for approximately 15 seconds. The trial for ignition indicator light should go out and the flame failure indicator light illuminate immediately after flame failure. Open the manual pilot gas valve. A normal pilot ignition sequence should take place within 6 minutes of the initial flame failure. The trial for ignition indicator light should stay on. Recycle the pilot several times to confirm reliable operation.

**Pilot Adjustment**

The pilot burner flame should be well defined and 2" to 2 1/2" above the surface of the burner, Figure 18. To adjust the pilot the following steps must be taken:

1. Remove the pilot gas pressure regulator cap.
2. Turn the pressure regulator adjustment screw clockwise to increase the flame and counterclockwise to decrease it.
3. Replace the pressure regulator adjustment screw cap.

**Fire Testing**

1. For an on/off unit confirm that the low-fire side of the two-stage gas valve is set to its maximum setting.

   For a two-stage unit a 1/16" thick silicon spacer should be installed under the lo-fire adjusting screw. Without this spacer it won't be possible to consistently set the low-fire pressure to 2.4" w.c.

2. Follow the instructions in the OPERATING INSTRUCTIONS section starting on page 18 to fire the main burner. Upon ignition of the main burner adjust the high fire adjusting screw to obtain the hi fire pressure listed in Table 10. On a two-stage unit disconnect the power from the high fire side of the gas valve and adjust the low fire regulator. If the unit short cycles on low fire adjust the air box pressure and gas back pressure as outlined below.

**CAUTION**

**Never force the regulator adjustment screw beyond the stop limits or damage to the regulator will occur!**

**TABLE 10 – Pressure Settings**

| Model Size | Natural Gas. Low (in. w.c.) | Natural Gas. Hi (in. w.c.) | LP Gas Low (in. w.c.) | LP Gas Hi (in. w.c.) |
|---|---|---|---|---|
| 500 | n/a | 3.0 | n/a | 7.0 |
| 750 | n/a | 3.0 | n/a | 7.0 |
| 1000 | n/a | 3.0 | n/a | 7.0 |
| 1250 | 2.4 | 3.0 | 6.0 | 7.0 |
| 1500 | 2.4 | 3.0 | 6.0 | 7.0 |
| 1750 | 2.4 | 3.0 | 6.0 | 7.0 |
| 1950 | 2.4 | 3.0 | 6.0 | 7.0 |

3. When fire tested at the factory the unit's input was rated and the gas pressure(s) recorded on the test label affixed to the jacket next to the junction box. To confirm the input of the unit follow the instructions in the INPUT RATE section below. The gas pressure setting(s) for dual fuel units may vary; refer to the test label on the unit.

4. An undiluted flue gas sample must be taken at the flue outlet using a calibrated flue gas analyzer. Allow the unit to run for 15 minutes before taking the sample. For a natural gas unit the low fire CO2 reading should be 6.7% - 7.0%. The hi fire CO2 reading must be 7.7% -8.0%. Exceeding 8.0%. CO2 will shorten the life of the burner. An LP unit will have CO2 readings proportionally higher. Adjust the inlet air damper to achieve the correct CO2 readings.

5. If the pressure setting(s) vary from those in the table list them on the test label affixed to the jacket next to the junction box.

6. To test the ignition safety shutoff device, close the manual shutoff valve in the gas supply line. Within 5 seconds of main burner flame extinction, the main gas valve solenoid should close with an audible noise. After 15 seconds the module should lockout and the trial for ignition end. After 5 minutes a second trial for ignition should occur. Open the manual shutoff valve in the gas supply line and reset the ignition control system. A normal ignition sequence should take place. If the burner hasn't lit after the last ignition try, the gas valve will close and the system will go into lock out. Inspect the ignition system to determine what the problem is.

7. With the main burner in operation, close the manual firing valve. As soon as the main burner flames go out, open the manual firing valve. A normal ignition sequence should take place. If the burner fails to light the system will make one more ignition attempt.

8. With the burners in operation, interrupt the power to the control circuit by lowering the operating control or thermostat. The main burners should go out. Reset the operating control or thermostat, a normal ignition sequence should follow.

**Air Box Pressure**
Connect a manometer to the air box pressure tap located behind the control cover, Figure 20.

**Figure 20 – Air Box Pressure Tap**

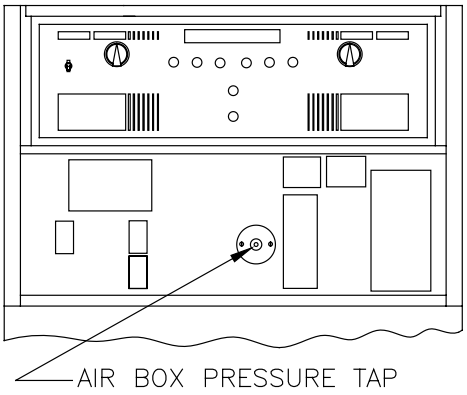



Table 11 lists the factory settings for the air box pressure and gas back pressure that were set using a minimum length of vent pipe. It may be necessary to adjust the air shutter on the blower to achieve accep-able combustion readings for certain installations.

If vented vertically ensure that the barometric damper is capable of maintaining the air box pressure listed in Table 10. An air box pressure lower that that listed in Table 10 can significantly reduce the life of the burner.

Long horizontal vents will result in an air box pressure higher that that listed in Table 10. It may be necessary to open the air damper to obtain the correct combustion settings.

**Gas Back Pressure**
Connect a manometer to the gas pressure test port upstream of the firing valve, Figure 21. Close the manual shut off valve for the pilot gas. Ensure that the firing valve is in the open position. Energize the unit and allow it to try for ignition until it goes into flame failure. If the gas back pressure is significantly different from that listed in Table 10 the air/gas mixing tube may be misaligned.

**Figure 21 – Air Adjustment & Gas Pressure Test Port**

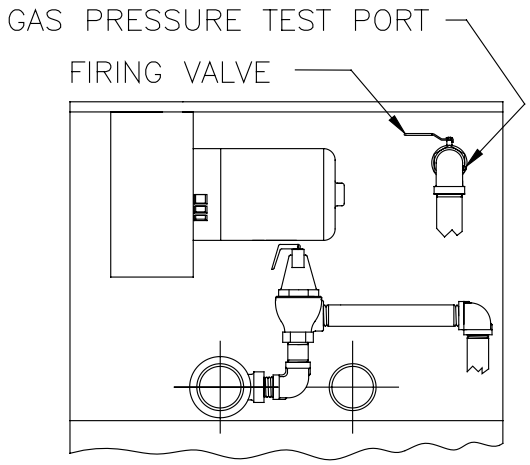



**TABLE 11 – Pressure Settings**

| Model Size | Air Box Pres. (in. w.c.) | Gas Back Pres. (in. w.c.) |
|---|---|---|
| 500 | 1.3 | 0.3 |
| 750 | 2.0 | 0.6 |
| 1000 | 3.0 | 0.6 |
| 1250 | 2.0 | 0.3 |
| 1500 | 2.5 | 0.3 |
| 1750 | 2.8 | 0.3 |
| 1950 | 3.2 | 0.3 |

**Input Rate, Natural Gas**
Gas appliances are rated based on sea level operation with no adjustment required at elevations up to 2000 feet. At elevations above 2000 feet, input ratings should be reduced by 4% for each 1000 feet above sea level. Check the input rate as follows:

1. Turn off all other gas appliances that use the same gas meter as the boiler/water heater.
2. Call your gas supplier and ask for the heating value of the gas.
3. Start the boiler/water heater and let it run for 15 minutes.
4. Using the gas meter and a stopwatch, clock the time that it takes to burn 10 cubic foot of gas and divide this time by 10.
5. Insert the heating value and the time, in seconds, into the formula below.
6. Input = (heating value, Btu/hr)(3600)/(time, seconds)
7. If the computed rate deviates by more than 5% from the rated input value of the unit adjust the manifold pressure accordingly. DO NOT adjust the manifold pressure by more than 5%. If a proper rate cannot be maintained without adjusting the manifold pressure beyond the 5% limit, the main burner orifices must be replaced. If the input rate is too low, go to the next lager size of main burner orifices. If the input rate is too high, go to the next smaller size.

**CAUTION**
**Never increase the input to the boiler/water heater above that for which it is rated. Doing so can cause premature failure of the boiler!**

**Low Water Cutoff**
If installed, ensure that the low water cutoff device(s) function properly. Test in accordance with the manufacturer's instructions included with the device(s).

**Boiler Thermostat**
If a thermostat is to be used to control the boiler always follow the instructions included with the thermostat. Proper location of the thermostat will ensure efficient trouble-free operation of the boiler. Mount the thermostat to an inside wall at a height approximately five feet above the floor. Avoid placing the thermostat in areas that will not provide an accurate measurement of the room temperature. Locating the thermostat behind a door, in an alcove, close to a source of thermal radiation or in a drafty area will cause poor or sporadic heating.

For a thermostat that employs an adjustable heat anticipator, adjust the anticipator to match the current measured in the thermostat circuit. An increased anticipator setting may be necessary if the unit cycles frequently. If the room temperature over-shoots the thermostat setting, reduce the anticipator setting.

**Water Heater Operation Controls**
The operating control on the water heater is set to its lowest setting when the water heater leaves the factory. The preferred control setting for potable hot water is 130˚F. The operating control should be set to the lowest setting that will satisfy the consumer's needs. The water heater high limit should be set a minimum of 40˚F (22˚C) higher than the operating control. Refer to the HOT WATER SUPPLY section for the proper supply water temperature.

WARNING Setting the thermostat or operation control too high can result in scalding resulting in severe personal injury!

Allow the unit to cycle on the operator. The temperature rise across the heat exchanger must not exceed 30˚F.

## DIAGNOSTICS

The Futera II has a number of indicator lights that are intended to display the sequence of operation. The lights also serve to point out possible problem areas should the unit fail to operate. The function of each light is listed below.

Power On: Indicates that power is being supplied to the unit.

Operator: Indicates that there is a call for heat.

High Limit: Stays lit until a call for heat has been satisfied or the outlet temperature exceeds the safety setting on the high limit during a call for heat.

Water Flow: Illuminates when proper water flow exists during a call for heat.

Air Flow: Illuminates when proper combustion airflow has been established.

Trial Ignition: Illuminates whenever the pilot gas valve is energized.

Main Burner: Illuminates whenever the main gas valve is energized.

Flame Failure: Illuminates whenever the ignition control is unable to establish a pilot flame within the trial for ignition period.

## MAINTENANCE

WARNING
Disconnect electrical power and close the manual gas shut off valve before performing maintenance or severe personal injury may result!

**CAUTION**
**Servicing, inspection and adjustment must be done by a trained technician in accordance with all applicable local and national codes. Improper servicing or adjustment can damage the boiler /water heater!**

The boiler/water heater must be cleaned and inspected at least once a year and before each heating season. Make sure that the burner and ignition components are free from dust, soot, dirt, corrosion or other deposits that would impair the boiler/water heater 's performance. Refer to page 25 for component identification.

**CAUTION**
**Improper burner servicing can result in premature burner failure voiding the warranty!**

**Burner Removal & Inspection**
1. Close the manual shutoff valves in the gas supply lines and turn off electrical power to the boiler/water heater.
2. Remove the jacket top panel.
3. Remove the combustion chamber top panel.
4. Remove the air gas mixing tube.
5. Disconnect the pilot tubing and ignition/sensing lead from the burner.
6. Remove the four nuts that attach the burner to the heat exchanger.
7. Carefully lift the burner out of the unit.
8. Inspect the burner for damage or signs of deterioration. Use a brush or compressed air to remove any debris from the burner ports.
9. DO NOT install a damaged or badly corroded burner, replace it.
10. Install the burner making sure that the burner gasket is not torn or deteriorated. If it is replace it.
11. Reassemble the unit following the removal steps in reverse order.

**Heat Exchanger Inspection**
1. Close the manual shutoff valves in the gas supply lines and turn off electrical power to the boiler/water heater.
2. Remove burner following the instructions in the **Burner Removal & Inspection** section.
3. Remove the front jacket panel and combustion chamber door.
4. Inspect the inside and outside of the heat exchanger for signs of damage, sooting or corrosion.
5. The outside surfaces of the copper tubes should be free of any soot deposits. A slight black smudge is normal with some types of gases. Black soot indicates poor combustion. Green deposits indicate condensation due to low return water temperatures. In either case the heat exchanger must be cleaned thoroughly and the problem resolved before the boiler/water heater is returned to service.
6. If there are no signs of damage, sooting or corrosion reassemble the unit following the previous steps in reverse order.
7. A badly corroded or damaged heat exchanger must be replaced, see the **Heat Exchanger Repair & Replacement** section.

**Heat Exchanger Cleaning**

1. Close the shut off valves in the inlet and outlet piping. On heating systems close the system fill valve and relieve the system pressure from the boiler by carefully lifting the relief valve or opening the drain valve.
2. Disconnect the boiler/water heater from the system piping.
3. Remove the eight bolts on the rear pipe enclosure panel.
4. Remove the front jacket panel and combustion chamber door.
5. Slide the heat exchanger out of the unit.
6. Remove the "V" baffle straps and "V" baffles.
7. Thoroughly clean the heat exchanger with water from a high-pressure hose. Use a soft bristle brush if necessary.
8. Replace the cleaned heat exchanger and other components in the reverse order of their removal.

**Heat Exchanger Repair & Replacement**

1. A leaking or otherwise damaged tube(s) can be replaced as outlined in steps 2 through 8.
2. Remove the heat exchanger from the boiler/water heater as outlined in the **Heat Exchanger Cleaning** section.
3. Remove the pipe plugs from the inlet/outlet and return headers opposite from the ends of the tube(s) being replaced.
4. Carefully cut the damaged tube(s) in half taking care not to damage the adjacent tubes.
5. Install and swage in place the new tube(s).
6. Replace the pipe plugs using a suitable tread sealant on each one.
7. Sagging or distorted heat exchanger tubes are an indication of low water flow through the system. A damaged heat exchanger must be replaced and the condition that caused the damage resolved before the boiler/water heater is returned to service.
8. Replace the heat exchanger and other components in the reverse order of their removal.

**Air Intake & Vent System**

Thoroughly inspect the air intake and vent systems for any signs of blockage, corrosion or leakage. Immediately replace any unsound vent system piping. Inspect the air filter and wash with warm water and soap if dirty.

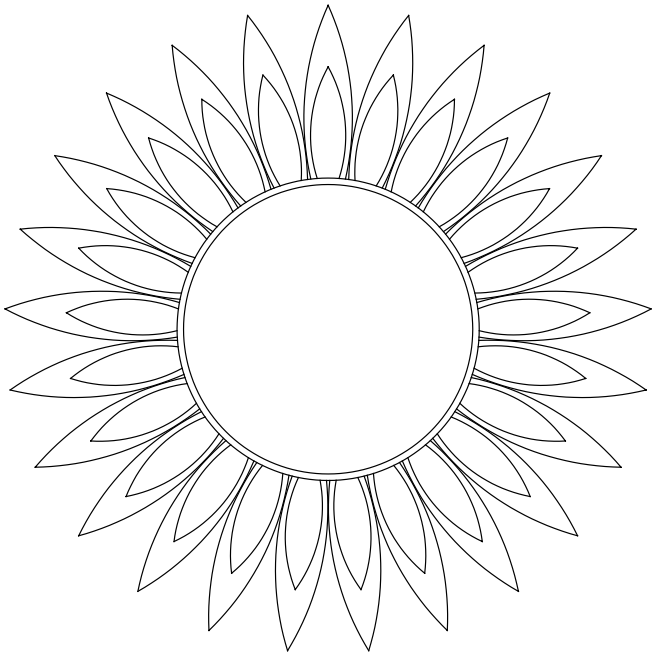
**Controls**

Use the BOILER/WATER HEATER OPERATION and CHECKING AND ADJUSTMENT sections of this manual for reference.

1. Check the thermostat or operating controls for proper operation.
2. A float type low water cutoff device must be flushed out per the manufacturers' instructions. The probe on a probe low water cut off must be removed, cleaned and inspected at least once a year. Ensure that the low water cutoffs operate properly. In not, replace them.
3. The flow switch contacts must be open when water flow is not present.
4. The relief valve should not weep or discharge water at normal system pressure. If it does contact a qualified service technician to have it inspected. NEVER try to clean or repair the relief valve! If the valve fails to operate properly, have it replaced!
5. The aquastat high limit controls the maximum water temperature in the boiler. It is adjustable from 140°F (60˚C) to 250°F (121°C). If the water temperature reaches the set temperature before the demand for heat has been met, the aquastat high limit should shut the boiler off. The water temperature should never exceed the maximum set point of 250°F (121°C). The aquastat high limit cannot be repaired. If it fails to function properly replace it.
6. Visually check the pilot and main burner flames to ensure proper operation, see Figures 18 & 22.

WARNING
A yellow, floating flame indicate a lack of combustion air. Do not operate the boiler/water heater until the problem is solved or severe personal injury or death may occur!

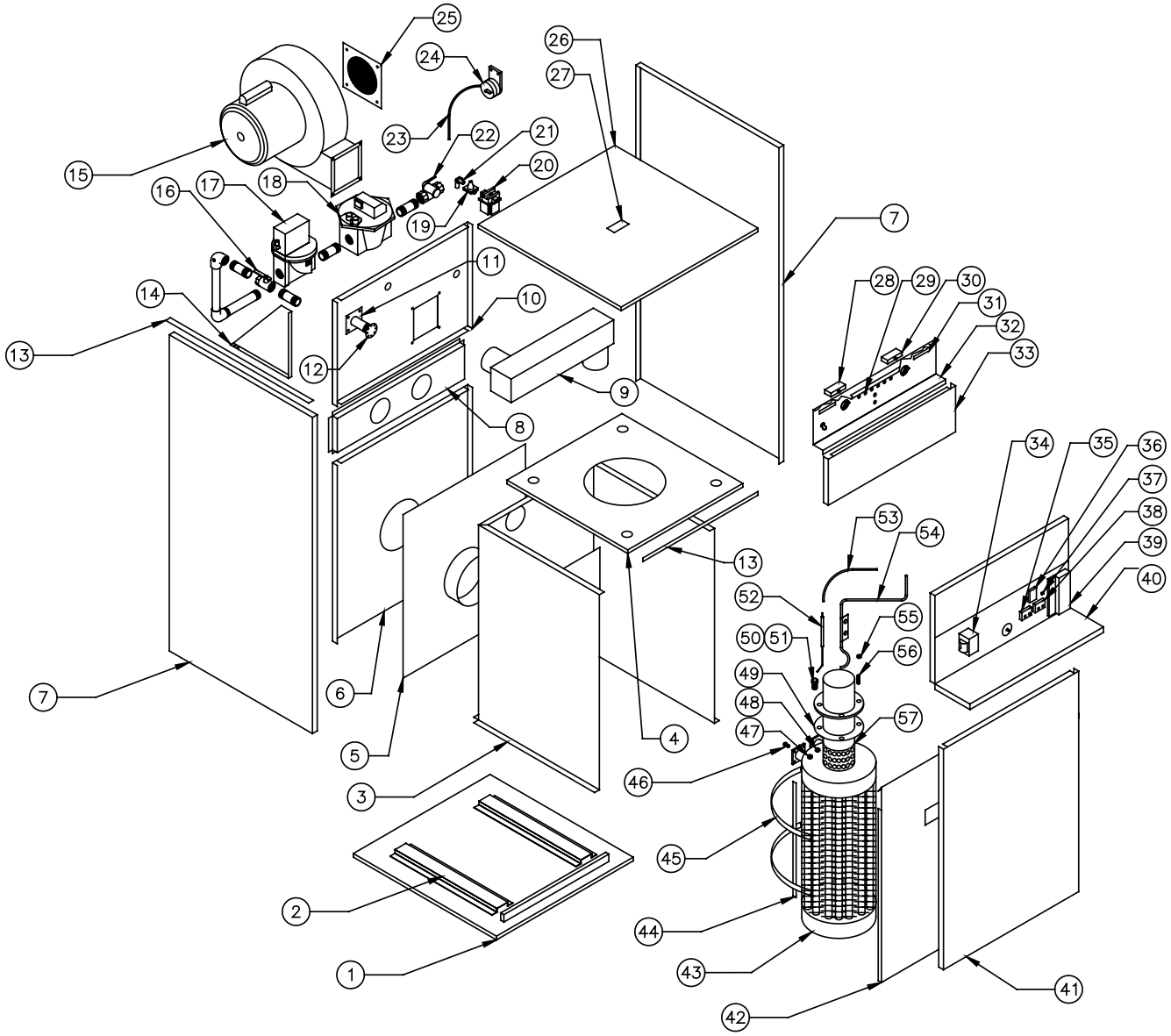
**Figure 22 – Main Burner Flame**



## TROUBLE-SHOOTING

| OPERATIONAL PROBLEMS | CORRECTIVE ACTION |
|---|---|
| 1. The “Power On” light doesn’t illuminate. | Ensure that proper voltage is being supplied to the unit.<br>Inspect the circuit breaker for the boiler/water heater circuit.<br>Check the light.<br>Ensure that the power switch operates properly and is wired correctly.<br>Check the transformer for proper operation. |
| 2. The “Power On” light illuminates, a call for heat is initiated, but the blower does not purge. | Confirm that the blocked flue switch connections are correct.<br>Confirm that 24 volts is present on the power on time delay relay initiate contact.<br>Confirm that 110 volts is present on the power on time delay relay switching contact.<br>Inspect the blower for defects. |
| 3. The “Water Flow” indicator light does not illuminate. | Check the light.<br>Ensure that the boiler/water heater has been completely purged of air.<br>Ensure that the pump is operating properly/rotating in the proper direction.<br>Ensure that all system valves are in the correct position and that no restrictions in the piping are present.<br>Confirm that the flow switch is wired correctly and functions properly. |
| 4. The “Air Flow” indicator light does not illuminate. | Check the light.<br>Inspect the vent and air intake systems to ensure that blockages are not present.<br>Ensure that the vent and air intake systems conform to the guidelines in this manual.<br>Confirm that the blocked flue switch connections are correct and that it is functioning properly.<br>Ensure that the blower air inlet damper & pressure switch are adjusted for the correct air box pressure. |
| 5. The “Trial for Ignition” indicator light does not illuminate after the prepurge cycle. | Check the light.<br>Confirm that the ignition module is not in a lock out mode.<br>Check the pilot off time delay relay.<br>Confirm that the ignition module is functioning properly. |
| 6. The “Burner On” indicator light does not illuminate. | Check the light.<br>Confirm that the indicator light is properly wired. |
| 7. The “Trial for Ignition” indicator light illuminates, but the igniter does not spark. | Confirm that the ignition module is properly wired.<br>Confirm that the ignition lead isn’t grounded out.<br>Inspect the igniter and ensure that the spark gap is correct.<br>Ensure that the ignition module is properly grounded. |
| 8. The “Burner On” ignites, but the natural gas high fire manifold pressure is less than 2.5 in. W.C. | Ensure that at least the minimum inlet pressure is supplied at the inlet of the gas valve. |
| 9. The Boiler/Water Heater rumbles on start up. | Ensure that the burner is set up per the CHECKING, ADJUSTMENT & OPERATION section.<br>Ensure that the unit is properly vented. |

**Figure 23 – Exploded View**



| Futera II Model Size with Item Quantities Below | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Ref #** | **Name of Part** | **Part #** | **500** | **750** | **1000** | **1250** | **1500** | **1750** | **1950** |
| 1 | Base Panel Assembly | 70-2163 | 1 | 1 | 1 | | | | |
| | | 70-2164 | | | | 1 | 1 | 1 | 1 |
| 2 | Base Panel Heat Exchanger Legs | 03-1599 | 1 | 1 | 1 | | | | |
| | | 03-1600 | | | | 1 | 1 | 1 | 1 |
| 3 | Combustion Chamber Rear/Side Panel Assy | 70-2144 | 1 | | | | | | |
| | | 70-2145 | | 1 | | | | | |
| | | 70-2146 | | | 1 | | | | |
| | | 70-2147 | | | | 1 | | | |
| | | 70-2148 | | | | | 1 | | |
| | | 70-2149 | | | | | | 1 | |
| | | 70-2150 | | | | | | | 1 |
| 4 | Combustion Chamber Top Panel | 03-1552 | 1 | 1 | 1 | | | | |
| | | 03-1553 | | | | 1 | 1 | 1 | 1 |
| 5 | Rear Pipe Enclosure Panel Assembly | 70-2108 | 1 | 1 | 1 | | | | |
| | | 70-2109 | | | | 1 | 1 | 1 | 1 |
| 6 | Lower Rear Jacket Panel | 03-1516 | 1 | | | | | | |
| | | 03-1517 | | 1 | | | | | |
| | | 03-1518 | | | 1 | | | | |
| | | 03-1519 | | | | 1 | | | |
| | | 03-1520 | | | | | 1 | | |
| | | 03-1521 | | | | | | 1 | |
| | | 03-1522 | | | | | | | 1 |
| 7 | Left Jacket Panel | 03-1523 | 1 | | | | | | |
| | | 03-1524 | | 1 | | | | | |
| | | 03-1525 | | | 1 | | | | |
| | | 03-1526 | | | | 1 | | | |
| | | 03-1527 | | | | | 1 | | |
| | | 03-1528 | | | | | | 1 | |
| | | 03-1529 | | | | | | | 1 |
| | Right Jacket Panel | 03-1530 | 1 | | | | | | |
| | | 03-1531 | | 1 | | | | | |
| | | 03-1532 | | | 1 | | | | |
| | | 03-1533 | | | | 1 | | | |
| | | 03-1534 | | | | | 1 | | |
| | | 03-1535 | | | | | | 1 | |
| | | 03-1536 | | | | | | | 1 |
| 8 | Rear Pipe Enclosure Panel Assembly | 70-2108 | 1 | 1 | 1 | | | | |
| | | 70-2109 | | | | 1 | 1 | 1 | 1 |
| 9 | Air/Gas Mixing Tube Assembly | 70-2183 | 1 | 1 | 1 | | | | |
| | | 70-2184 | | | | 1 | 1 | 1 | 1 |
| 10 | Upper Rear Jacket Panel | 03-1509 | 1 | 1 | 1 | | | | |
| | | 03-1510 | | | | 1 | 1 | 1 | 1 |
| 11 | Manifold Flange Screw | 57-0012 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 12 | Main Gas Orifice | 10-0058 | 1 | | | | | | |
| | | 10-0059 | | 1 | | | | | |
| | | 10-0060 | | | 1 | | | | |
| | | 10-0061 | | | | 1 | | | |
| | | 10-0062 | | | | | 1 | | |
| | | 10-0063 | | | | | | 1 | |
| | | 10-0064 | | | | | | | 1 |

| Futera II Model Size with Item Quantities Below | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Ref #** | **Name of Part** | **Part #** | **500** | **750** | **1000** | **1250** | **1500** | **1750** | **1950** |
| 13 | Jacket Gasket Material, 25 feet | 66-0101 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 14 | Gas Train Support Bracket | 03-1639 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 15 | Fan Assembly | 70-2200 | 1 | 1 | 1 | | | | |
| | | 70-2201 | | | | 1 | 1 | | |
| | | 70-2202 | | | | | | 1 | 1 |
| 16 | Firing Valve, 1" | 11-0456 | 1 | 1 | | | | | |
| | Firing Valve, 1 1/4" | 11-0457 | | | 1 | 1 | 1 | | |
| | Firing Valve, 1 1/2" | 11-0458 | | | | | | 1 | 1 |
| 17 | Main Gas Valve, HW V88A, 1" | 11-0156 | 1 | 1 | | | | | |
| | Main Gas Valve, HW V88A, 1 1/4" | 11-0157 | | | 1 | 1 | 1 | | |
| | Main Gas Valve, HW V88A, 1 1/2" | 11-0158 | | | | | | 1 | 1 |
| 18 | Main Gas Valve, V8944B, 1" | 11-0171 | 1 | 1 | | | | | |
| | Main Gas Valve, V8944B, 1 1/4" | 11-0172 | | | 1 | 1 | 1 | | |
| | Main Gas Valve, V8944B, 1 1/2" | 11-0173 | | | | | | 1 | 1 |
| 19 | Pilot Regulator, RV12LT | 11-0041 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 20 | Pilot Valve, 24 V Solenoid | 11-0017 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 21 | Pilot Valve, Manual | 11-0031 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 22 | “A” Valve, 1" | 11-0451 | 1 | 1 | | | | | |
| | “A” Valve, 1 1/4" | 11-0452 | | | 1 | 1 | 1 | | |
| | “A” Valve, 1 1/2" | 11-0453 | | | | | | 1 | 1 |
| 23 | Pressure Switch Tubing | 06-0052 | 1 | 1 | 1 | | | | |
| | | 06-0053 | | | | 1 | 1 | 1 | 1 |
| 24 | Blocked Flue Switch | 14-0052 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 25 | Inlet Air Orifice Assembly | 70-2203 | 1 | 1 | 1 | | | | |
| | | 70-2204 | | | | 1 | 1 | 1 | 1 |
| 26 | Top Jacket Panel | 03-1507 | 1 | 1 | 1 | | | | |
| | | 03-1508 | | | | 1 | 1 | 1 | 1 |
| 27 | Top Panel View Port Frame | 20-0003 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Top Panel View Port Glass | 20-0004 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 28 | Operator, G1P-9868, FW, On/Off | 14-0116 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Operator, G1P-9870, FB, On/Off | 14-0118 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Operator, L6008G-1009, FW/FB, 2 Stage | 14-0107 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 29 | Indication Lights, 24 Volt Green | 48-0451 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Indication Lights, 24 Volt Red | 48-0453 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| | Indication Lights, 125 Volt Green | 48-0452 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Indication Lights, 125 Volt Red | 48-0454 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| 30 | Hi Limit, G1P-9868, Canadian FW | 14-0117 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Hi Limit, G1P-9870, Canadian FB | 14-0118 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Hi Limit, L4008E-1313, American FW | 14-0105 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Hi Limit, L4008E-1040, American FB | 14-0104 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 31 | Thermometer | 14-0005 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

| Futera II Model Size with Item Quantities Below | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Ref #** | **Name of Part** | **Part #** | **500** | **750** | **1000** | **1250** | **1500** | **1750** | **1950** |
| 32 | Light Package Assy, Plain - 24 V | 70-2113 | 1 | 1 | 1 | | | | |
| | Light Package Assy, Plain - 24 V | 70-2114 | | | | 1 | 1 | 1 | 1 |
| | Light Package Assy, w/ Operator - 24 V | 70-2115 | 1 | 1 | 1 | | | | |
| | Light Package Assy, w/ Operator - 24 V | 70-2116 | | | | 1 | 1 | 1 | 1 |
| | Light Package Assy, w/ High Limit - 24 V | 70-2117 | 1 | 1 | 1 | | | | |
| | Light Package Assy, w/ High Limit - 24 V | 70-2118 | | | | 1 | 1 | 1 | 1 |
| | Light Pkg. Assy., w/ OP & H L - 24 V | 70-2119 | 1 | 1 | 1 | | | | |
| | Light Pkg. Assy., w/ OP & H L - 24 V | 70-2120 | | | | 1 | 1 | 1 | 1 |
| | Light Package Assy, Plain - 120 V | 70-2121 | 1 | 1 | 1 | | | | |
| | Light Package Assy, Plain - 120 V | 70-2122 | | | | 1 | 1 | 1 | 1 |
| | Light Package Assy, w/ Operator - 120 V | 70-2123 | 1 | 1 | 1 | | | | |
| | Light Package Assy, w/ Operator - 120 V | 70-2124 | | | | 1 | 1 | 1 | 1 |
| | Light Package Assy, w/ High Limit - 120 V | 70-2125 | 1 | 1 | 1 | | | | |
| | Light Package Assy, w/ High Limit - 120 V | 70-2126 | | | | 1 | 1 | 1 | 1 |
| | Light Pkg. Assy., w/ OP & H L - 120 V | 70-2127 | 1 | 1 | 1 | | | | |
| | Light Pkg. Assy., w/ OP & H L - 120 V | 70-2128 | | | | 1 | 1 | 1 | 1 |
| 33 | Control Panel Cover | 03-1543 | 1 | 1 | 1 | | | | |
| | | 03-1544 | | | | 1 | 1 | 1 | 1 |
| 34 | 40va transformer, J14-03245-011 | 15-0002 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 35 | Prepurge Relay | 15-0108 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 36 | Post Purge Relay | 15-0101 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 37 | Flame Failure Relay | 15-0106 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 38 | Pilot Relay | 15-0109 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 39 | S8610M Ignition Module | 16-0054 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 40 | Control Panel | 03-1540 | 1 | 1 | 1 | | | | |
| | | 03-1541 | | | | 1 | 1 | 1 | 1 |
| 41 | Front Jacket Panel | 03-1545 | 1 | | | | | | |
| | | 03-1546 | | 1 | | | | | |
| | | 03-1547 | | | 1 | | | | |
| | | 03-1548 | | | | 1 | | | |
| | | 03-1549 | | | | | 1 | | |
| | | 03-1550 | | | | | | 1 | |
| | | 03-1551 | | | | | | | 1 |
| 42 | Combustion Chamber Door Assembly | 70-2156 | 1 | | | | | | |
| | | 70-2157 | | 1 | | | | | |
| | | 70-2158 | | | 1 | | | | |
| | | 70-2159 | | | | 1 | | | |
| | | 70-2160 | | | | | 1 | | |
| | | 70-2161 | | | | | | 1 | |
| | | 70-2162 | | | | | | | 1 |
| 43 | Heat Exchanger Assy, Bronze Headers Standard SB75 Tubes, ASME | 70-2186 | 1 | | | | | | |
| | | 70-2187 | | 1 | | | | | |
| | | 70-2188 | | | 1 | | | | |
| | | 70-2189 | | | | 1 | | | |
| | | 70-2190 | | | | | 1 | | |
| | | 70-2191 | | | | | | 1 | |
| | | 70-2192 | | | | | | | 1 |

| Futera II Model Size with Item Quantities Below | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Ref #** | **Name of Part** | **Part #** | **500** | **750** | **1000** | **1250** | **1500** | **1750** | **1950** |
| 43 | Heat Exchanger Assy, Bronze Headers | 70-2193 | 1 | | | | | | |
| | Optional SB111 Cupro Nickel Tubes, ASME | 70-2194 | | 1 | | | | | |
| | | 70-2195 | | | 1 | | | | |
| | | 70-2196 | | | | 1 | | | |
| | | 70-2197 | | | | | 1 | | |
| | | 70-2198 | | | | | | 1 | |
| | | 70-2199 | | | | | | | 1 |
| 44 | Heat Exchanger “V” Baffle | 03-1612 | 1 | | | | | | |
| | | 03-1613 | | 1 | | | | | |
| | | 03-1614 | | | 1 | | | | |
| | | 03-1615 | | | | 1 | | | |
| | | 03-1616 | | | | | 1 | | |
| | | 03-1617 | | | | | | 1 | |
| | | 03-1618 | | | | | | | 1 |
| 45 | Heat Exchanger “V” Baffle Strap | 03-1619 | 1 | 1 | 1 | | | | |
| | | 03-1620 | | | | 1 | 1 | 1 | 1 |
| 46 | Heat Exchanger Flange Bolts | 57-0124 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 47 | Aquastat/Limit Well | 13-0104 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 48 | Thermometer Well | 13-0102 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 49 | Burner Gasket | 06-0011 | 1 | 1 | 1 | | | | |
| | | 06-0012 | | | | 1 | 1 | 1 | 1 |
| 50 | Burner View Port Assembly | 70-2205 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 51 | Burner View Port Glass | 20-0006 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 52 | Electrode/Spark Rod | 16-0301 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 53 | Ignition Cable | 16-0201 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 54 | Pilot Tube | 04-0515 | 1 | 1 | 1 | | | | |
| | | 04-0516 | | | | 1 | 1 | 1 | 1 |
| 55 | Burner Nut | 57-0492 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 56 | Burner Stud | 57-0213 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 57 | Main Burner | 10-0268 | 1 | | | | | | |
| | | 10-0269 | | 1 | | | | | |
| | | 10-0270 | | | 1 | | | | |
| | | 10-0271 | | | | 1 | | | |
| | | 10-0272 | | | | | 1 | | |
| | | 10-0273 | | | | | | 1 | |
| | | 10-0274 | | | | | | | 1 |
| Not Shown | Conversion Kit Natural to LP Gas | 21-0093 | 1 | | | | | | |
| | | 21-0094 | | 1 | | | | | |
| | | 21-0095 | | | 1 | | | | |
| | | 21-0096 | | | | 1 | | | |
| | | 21-0097 | | | | | 1 | | |
| | | 21-0098 | | | | | | 1 | |
| | | 21-0099 | | | | | | | 1 |
| Not Shown | Conversion Kit LP to Natural | 21-0100 | 1 | | | | | | |
| | | 21-0101 | | 1 | | | | | |
| | | 21-0102 | | | 1 | | | | |
| | | 21-0103 | | | | 1 | | | |
| | | 21-0104 | | | | | 1 | | |
| | | 21-0105 | | | | | | 1 | |
| | | 21-0106 | | | | | | | 1 |

RBI WATER HEATERS

260 North Elm Street
Westfield, MA 01085
Phone: (413) 568-9571
Fax: (413) 568-9613

1300 Midway Boulevard
Mississauga, Ontario L5T 2G8 Canada
Phone: (905) 670-5888
Fax: (905) 670-5782

www.rbiwaterheaters.com

A MESTEK COMPANY